Gas Journal

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Editorial Notes

Unhappy Coal Situation

THE coal situation is reviewed by Mr. James Jamieson, of Edinburgh, in his Presidential Address to the North British Association of Gas Managers; and he, in common with so many gas executives, views the position with disquiet. The Gas Industry has no control over output; it is compelled by statute to maintain supplies of gas; it is imperative that it should be assured of adequate supplies of coal of the right quality. Yet gas undertakings have been compelled to accept grades and sizes of coal not only inferior but in many cases quite unsuitable, and this without any compensating reduction in contract price. Not only this. Contracts are not being implemented in regard to quantity. Mr. Jamieson mentions that, as far as his own undertaking is concerned, during the past four winter months the shortage in contracted quantities has amounted to 20,000 tons, and "a repetition of the past two winters in Edinburgh would be much too dangerous to contemplate." Our Industry is not alone, of course, in suffering from this mal-distribution of coal. As we mentioned in these columns last week, complaint is made in the annual report of the Central Electricity Board of the difficulties encountered in obtaining supplies of coal in accordance with contracts placed and in making contracts for the delivery of coal of the size and quality for the use of which the boiler furnaces of the generating stations have been designed; and an industrialist in a letter on the subject published in *The Times* a day or two ago remarked that if those responsible for administering the Coal Mines Act, 1930, and the quota, selling schemes, and selling committees which arose from it, do not modify their policy the country will find itself with two sorts of Special Areas—the one with unemployment due to a copious supply of coal and no market, the other with unemployment caused by a copious market and no coal.

To the Gas Industry the question of coal quality and quantity is of more importance than to any other coal user. The economics of gas production depend so much on the markets for by-products, and the results of having to treat coal which will not yield products satisfying the demands of these markets are too apparent to need emphasis. Again, plants are designed specifically to deal with certain classes of coal. Then the deterioration of coal on storage has to be taken into consideration. The Gas Industry must have freshly wrought coal. This applies with special force to the non-caking coals commonly used in Scotland. Mr. Jamieson observes that "after six months' exposure to the atmosphere supplies are affected to an extent hardly believable, and this makes the laying down of stocks at all a very doubtful proposition." In this connection he refers to the possibilities of utilizing cannel—a subject which, in collaboration with the Fuel Research Board, he has studied intensively. The results of this work, given in the Paper presented by Mr. Jamieson and Dr. King at the last annual meeting of The Institution of Gas Engineers, are fresh in our minds.

The utilization of cannel centres on the availability of supply; and, as recorded in the "JOURNAL," this problem has been investigated by the Oil from Coal Committee of the Scottish National Development Council. It is estimated that in Scotland there are reserves containing less than 8% of ash amounting to 25½ million tons, of which 20½ million tons are in the Lothians. The potential daily output is given at 1,438 tons, representing something in the neighbourhood of 500,000 tons per annum. Assuming this to be of a quality comparable with the Newbattle cannel on which the tests were made at Edinburgh, it would produce 70 million therms, or 65% of the gas supplied by statutory undertakings in Scotland, and on this basis the reserves would last for at least 50 years. Mr. Jamieson emphasizes that the capacity of carbonizing and coal handling plant is increased proportionately to the quantity of cannel used, while carbonizing costs fall in the same ratio. He points out that, if cannel had been used in Edinburgh last year instead of coal, the demand for gas would have been satisfied with a tonnage 32% less. Railway carriage would have been reduced by this amount; and applying the same comparison to the case of Greenock the reduction in tonnage required would amount to 50%. As for storage, cannel does not deteriorate when exposed to weathering, and as far as has been ascertained it is not subject to spontaneous combustion. For an emergency, a stock of good cannel is invaluable to any gas undertaking.

A Plea for Co-Operation

THE question of coal supplies is by no means the only topic discussed by Mr. Jamieson in his Address, which is a comprehensive review, full of constructive suggestions, of the state of affairs of the Gas Industry in Scotland. He puts in a strong plea for co-operative working—the organization of the Industry on national lines. Without such co-operation the small undertaking cannot hope to counter competition effectively and move with the times; nor can the large undertaking hope to progress in splendid isolation. Apart from physical amalgamation there can be co-operative buying, selling, training, finance, and research. Why, asks Mr. Jamieson, cannot there be established a research and training house for Scotland? It is essential that only men adequately trained should be employed in the Gas Industry. The provision of proper training facilities is not always an easy matter for the individual undertaking, but co-operation could overcome the difficulty. And surely, he observes, Scotland has a large enough industrial area to maintain at least one industrial research centre for the benefit of all. As for the disposal of by-products, the sale of coke in Scotland is "chaotic." The same cut-throat principles are employed as have brought other industries to the verge of ruin; and this in spite of the proved success of the London and Counties Coke Association. What applies to coke applies similarly to tar.

In regard to research, Mr. Jamieson shares our view that as an Industry we do not spend enough money on research. He points in particular to the urgent need for tackling the problem of eliminating the sulphur compounds from town gas. "Research in the past," he says, "has been responsible for harnessing practically all the products from the carbonization of coal and made their recovery economically possible. Are we to be baffled with the sprat that remains?" If it is a sprat it is a mighty important one; the presence of sulphur compounds in gas is hindering its development and at the same time endangering its reputation and the prestige of the Gas Industry. Research, needless to say, requires money. If sulphur in gas is to go—and it must go—we should surely be prepared to pay for the work necessary to make it possible. Mr. Jamieson suggests that if an appeal for funds were made for the elucidation of this one problem the money would be forthcoming. The reward, we would emphasize once again, which awaits the supply of a sulphur-free gas is simply enormous. In the field of heating it would be tantamount to a reduction in the price of gas from, say, 9d. to 5d. a therm. Our Industry pays dearly in the maintenance of appliances in efficient working order alone by sending out gas containing sulphur.

A Load to Cultivate

PART of Mr. Jamieson's Address is devoted to service to the consumer and a highly interesting analysis of the different domestic gas loads. In regard to service, here again Mr. Jamieson shares our oft-expressed opinion that, given a reasonably competitive price, service counts for more than cost with the vast majority of our consumers. He gives a series of graphs put forward in 1928 by his predecessor, Mr. Gracie, in his Presidential Address to the Association in 1928, and brings these charts up to date by incorporating the figures for the last year's working of the Edinburgh Gas Department. These graphs are illuminating in indicating the trend of gas consumption. They show for one thing that the market as it exists today depends chiefly upon the cooking load; and to the Gas Industry the maintenance of cooking as an unassailable base load is vital. In this connection Mr. Jamieson again calls for co-operative effort. The majority of small and medium-sized undertakings cannot, for example, afford to employ a full-time cookery demonstrator; and Mr. Jamieson suggests the setting up of a home service organization financed by the undertakings according to the use they make of it—a scheme requiring no grandiose plans involving legislation, only a willingness on the part of undertakings to make good use of the service. It is, however, to the water heating load that Mr. Jamieson attaches, quite rightly, so much importance in the future development of gas business. Exploitation of the load would, he maintains, revolutionize ideas on outputs, and, by filling up the summer valley, give a load factor such as to enable considerable reductions in prices all round. This load can be gained if it is tackled seriously by affording full facilities for the easy acquirement of appliances and by offering gas for this extra load at attractive rates.

Mr. Jamieson concludes his Address, which we hope will be the means of stirring up Scottish gas undertakings into co-operative action, by a graph which shows in proper perspective the progress made by gas and electricity in Edinburgh since 1920. The electricity increase in sixteen years has amounted to 550%, equivalent to 132 million units; in the same period gas output has increased by only 54%. The point is, however, that this increase is equivalent to 192 million units, or a third more than the electrical increase. At the same time, on similar comparisons gas undertakings generally would have had a much better story to relate had they practised what constitutes the main theme of Mr. Jamieson's Address—co-operation.

Home Oil Production

IF, as was shown in these columns last week, carbonization can never make any real contribution to the problem of making this country independent of imported oil supplies—although the existence of the oil market helps carbonization finances by providing useful by-products—what can be done to provide against an emergency?

If it were feasible, perhaps the greatest single step that could be taken would be to use gas as the motive power for vehicles. Nearly two million motor vehicles are registered in this country, and probably half our petrol requirement is for lorries and other heavy vehicles. Half of the 4½ millions of tons of petrol imported for this purpose could therefore be replaced by gas. A high proportion of the diesel-engined vehicles could equally be gas-driven in emergency. It must be confessed, however, that the use of gas does not seem to make headway, and there are difficulties yet to be overcome, which, however, would not be allowed to stand in the way in times of emergency. Among the numberless measures now being taken for national defence, we suggest that it should be made compulsory to provide fittings for gas cylinders on all vehicles over a certain horse-power, and that cylinders should be stored, and storage vessels and compressors should be installed, at public expense, so that the change-over could be made within a month of the opening of hostilities, should such an eventuality unhappily occur.

We have no hesitation in saying that the use of oil in most industrial and domestic appliances, whether for central heating, for boiler-firing, or for industrial heating, is unnecessary. Oil could be replaced by gas for

almost every purpose, and if a proper fuel policy were to be undertaken, there could be a great reduction in the amount of oil imported without subsidies, taxation of imports, or any of the other expensive devices that are now employed to permit of the home synthetic production of oil that is being imported needlessly. Under this heading, it would be possible, either now or as a war-time measure, to make up about half our present oil importation from purely domestic sources.

What is to be done about the remainder? Clearly, it is necessary to look for some method that does not depend upon the production of a major product, upon the market for which the production of oil must depend. Three methods suggest themselves. Hydrogenation, synthetic production from water gas by the Fischer-Tropsch process, and oil storage. It has been calculated that the production of all British fuel oil requirements by hydrogenation would involve the Government in Exchequer loss in the region of £40,000,000. It has also been put in another way; if the present c.i.f. price of petrol is 3½d., and it costs 6d. a gallon for the hydrogenation process to pay its way, we have to supply 2½d. a gallon out of our funds. On the 4½ million tons of motor spirit, that amounts to something like £13,500,000 a year for motor spirit alone—more than we should have to pay if we imported petrol tax-free. The £40,000,000 figure is based on the present tax levied upon imported oils.

Hydrogenation has the disadvantages that it must be operated as a process by highly skilled personnel; that it cannot be applied except at large central stations; that the plant is expensive in first cost; that the time taken to build plants must be considerable; that to keep such expensive plant standing idle until an emergency found a use for it would be unthinkable; and that hydrogenation plant would be highly susceptible to air attack. Our reading of the trend of events is that there will be no considerable extension of hydrogenation plant in this country. Time may, of course, falsify that prophecy.

The Fischer-Tropsch Process

THE Fischer-Tropsch process appears to be very much more popular abroad than hydrogenation, though no plant has yet been erected in this country. No official published figures are available as to the cost of operation, but it is generally understood to be cheaper to operate than hydrogenation. It is perhaps significant that hydrogenation plants are preferentially worked upon oils rather than upon coal. The Fischer-Tropsch process may have its disadvantages in cost as compared with the c.i.f. price of oils, but it has certain advantages which seem to commend it, at least for a trial upon a scale as large as the Billingham hydrogenation plant. Some of these are: The process can be operated upon any coal, even brown coal, provided that means can be found to convert the coal into water gas; it can be operated at any coking plant, or large gas-works, as an outlet for coke; being capable of installation at collieries, along with the coke ovens, there is far less concentration of plant and far less danger of successful air attack than with hydrogenation plant; the process operates at atmospheric pressure and at temperatures of the order of 200° C., and can thus be operated by a staff of normal training and intelligence; lastly, but by no means least, the quality of the diesel oil produced is very high indeed, and there is a large fraction, the proportion of which can be adjusted, which can be converted into lubricating oil. We have not heard of any other synthetic process in industrial operation that can produce lubricating oil. Professor Fischer, in his Institute of Fuel Melchett Medallist's Lecture, claimed that his lubricating oil was superior to that derived from petroleum.

The last suggested system is that of oil storage in bulk. The case for this was given recently at an informal meeting of the Institute of Fuel in March by Mr. H. Moore. Mr. Moore believes that the operations of submarines and hostile aircraft, intensified by the lessons of the last war, make it unsafe to assume that tanker services could be maintained effectively in another great war. Lubricating and fuel oils can be stored more easily than the volatile gasoline. In the event of successful attack resulting in the setting on fire of oil tanks, it would be easy to follow the standard practice in tank fires, and to pump the oil from below the surface of the affected tank away to other tanks for safe storage; even with gasoline there is no difficulty in that respect. It was suggested by Mr. Moore that some 250 storages should be arranged for gasoline, each of some 20,000 tons, at convenient points away from the towns, and that these would be linked up by overground pipelines which would follow the railways to make use of existing rights of way. He suggested that, to store 5 million tons of gasoline, there would be needed a capital expenditure of £10,000,000 for tanks, internal pipes, &c., together with 2,500 miles of supply pipelines costing a further £5,000,000; pump-houses and sundries might amount to a further £5,000,000, making £20,000,000 in all, which would be subject to very little depreciation. A scheme such as this would certainly serve to store the oil with reasonable safety, and to save transport, but what would be the evaporation loss? And who knows how long a war would last? If our tanker service is postulated to break down, must we not provide for at least 5 years' war, and with not less than double our present consumption because of the increased activity over the whole country in general and in our air-squadrons, and mechanized army in particular? We must also store heavy oils to the same amount. It seems to us, important as oil supplies are, that if storage were adopted as the main source of supply, we should have to envisage expenditure in the neighbourhood of £200,000,000, plus the cost of purchasing the oil and that of making good losses by leakage and evaporation.

Forthcoming Engagements

April.

16.—B.C.G.A. SALESMEN'S CIRCLES.—Annual Meeting, Caxton Hall, Westminster, 10.45 a.m.
17.—LONDON AND SOUTHERN JUNIORS.—Visit to Watford and St. Albans Gas-Works.
17.—MIDLAND JUNIORS.—Visit to Leamington Spa.
17.—WESTERN JUNIORS.—Annual General Meeting at Clevedon. Presidential Address by S. B. Jones.
21.—B.C.G.A.—Executive Committee, 11.30 a.m.; General Committee, 2.30 p.m.
21.—I.G.E.—Pipes Committee, 3 p.m.
22.—I.G.E.—Joint Lighting Committee, 2.30 p.m.
23.—B.C.G.A. — Midland District Conference at Gloucester.
23.—I.G.E.—Gasholder Committee, 2.30 p.m.
24.—YORKSHIRE JUNIORS.—Meeting at Bradford. Paper by H. Johnston, "Materials and their application to Gas-Works Constructions."
28.—SOUTHERN ASSOCIATION (EASTERN DISTRICT).—Meeting at Gas Industry House, 2.30 p.m. Discussion on "Alternative Methods of Electricity Supply on a Gas-Works."

May.

1.—SCOTTISH JUNIORS.—Joint Visit to Parkinson & Cowan, Ltd.
5.—S.B.G.I.—Annual General Meeting and Dinner, May Fair Hotel. Council Meeting in the morning at 56, Victoria Street, S.W. 1.

PERSONAL

Sir Reginald Clarry.

The retirement of Sir Reginald Clarry, M.P., from the Chairmanship of the British Road Tar Association will take place in June. Sir Reginald, who received a Knighthood in the New Year Honours of 1936, has been Chairman of the B.R.T.A. since 1930.

The new Chairman will be Mr. DAVIDSON PRATT, O.B.E., M.A., General Manager of the Association of British Chemical Manufacturers and Secretary of the Association of Tar Distillers, neither of which positions will be affected by Mr. Pratt's new appointment.

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At a meeting last week the Directors of the South Suburban Gas Company appointed Mr. T. BROWN (previously Secretary of the Company) General Manager and Secretary, Mr. V. Simmonds remaining Engineer, and Mr. J. A. Gould, Distributing Engineer.

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Mr. G. E. H. KEILLOR, until recently Assistant Engineer to the Worcester New Gas Light Company, has taken up his duties as Sales Manager to the Cambridge University and Town Gas Light Company.

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Mr. B. A. CARPENTER, Engineer, Manager, and Secretary of the Sheppy Gas Company, retired from that position on March 31 last, after 33 years' service with the Company. He was appointed Engineer in 1904 and Manager and Secretary in 1912. The sale of gas has increased from 80 million cu.ft. in 1912 to 192 million cu.ft. in 1936.

Mr. W. K. TATE, M.A., A.M.I.C.E., has been appointed to succeed him as Engineer and Manager. Mr. Tate was formerly an Assistant Engineer at the Beckton Works of the Gas Light and Coke Company, and was appointed Assistant Engineer and Manager at Sheppy eighteen months ago.

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Mr. FREDERICK WILSON, Engineering Assistant and Draughtsman to the Burnley Gas Department, has been appointed Assistant Manager with the Middlesbrough Gas Department. He succeeds Mr. J. W. Pallister, who (as announced earlier in these columns) has been promoted Engineer and Manager on the death of Mr. C. F. Blincoe.

Mr. Wilson is 36, and was chosen from 30 applicants. He started his career at Darlington, afterwards moving to Middlesbrough and then Stockton. He was Chief Draughtsman at Stockton, leaving to take up his present position at Burnley in 1931.

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Mr. ROBERT W. HARRIS, who has been employed in the Clitheroe Gas Department since leaving school 18 years ago, has been recommended as Engineer and Manager in succession to Mr. Robert Barrett, to whose retirement we referred in our issue of March 24.

Mr. Harris, Assistant Manager since 1931, played a part in the reconstruction scheme of 1928, which cost over £40,000. He holds the Higher Grade Certificate and Diploma of The Institution of Gas Engineers, of which he is an Associate Member. He is also a member of Manchester and District Juniors. Mr. Harris is 35.

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Mr. RAYMOND BEECH was appointed Manager and Secretary of the Kidsgrove Gaslight Company at a meeting of the Directors on March 22.

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Mr. W. R. HUNT, Manager of the Birmingham Branch of Messrs. Falk, Stadelmann, & Co., Ltd., retired from business on March 31. He has been with the Company for forty-two years and, since the opening of the Birmingham Branch, has been Manager in that City.

Mr. Hunt has been succeeded by Mr. H. G. ALLEN, who was formerly at the Dublin Branch.

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At the Annual Meeting on April 8 Mr. R. V. E. DE B. CRAWSHAY was elected a Director of the Consumers' Gas and Coke Company, Ltd., Bures. Mr. Crawshay is, of course, well known to the Industry as Managing Owner of the Southminster Gas Company.

Obituary

We regret to announce the death on Sunday of Mr. LAWRENCE GARDNER WILLIAMS, Chairman of the Directors of the Cardiff Gas Light and Coke Company. Mr. Williams, who was 76 years of age, died from heart failure following pneumonia. He was taken ill at a meeting of the Board, of which he had been Chairman since 1927. Mr. Williams joined the Board of the Company, with which he had been associated previously for five years, in 1912 on the death of Dr. Taylor, and was elected Chairman in succession to the late Mr. C. E. Dovey. He took a strong personal interest in the activities of the Company, its Co-Partnership Scheme, and in the general welfare of its employés.

It is the proud record of the late Chairman's family that they have been represented on the Directorate of the Company throughout the whole period of its existence, the first Chairman being Mr. C. C. Williams, who was then Mayor of Cardiff.

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The death took place at Blairgowrie, Perthshire, on April 3, of Mr. ALEXANDER CROWE MILNE, Chairman of the Blairgowrie Gas Light Company.

Institution of Engineers-in-Charge

"Good Work" the Watchword

That at the present time the things which are regarded as being of the most importance are cheapness and speed was suggested by Sir Alexander Gibb, the President of the Institution of Civil Engineers, when speaking last Friday evening on the occasion of the Annual Dinner of the Institution of Engineers-in-Charge. The hankering after cheapness he regards with disfavour, because he thinks that we in this country are not fitted to compete with those in whose work cheapness is the first aim. "If," Sir Alexander said to his hearers, "you are wishful to live a life that will give you satisfaction, you will not attain your end through cheapness. If this country cannot succeed in doing good work, it must inevitably fail. 'Good work' must be the country's watchword." The Institution of Engineers-in-Charge, he went on, were on the right lines, for they were among the organizations which required a definite standard of efficiency from their members.

For a great many years now (last week's was the thirty-seventh of the series) the Institution of Engineers-in-Charge have dined together annually in the King's Hall of the Holborn Restaurant, and as each occasion comes round it appears to "top" its predecessors in regard both to the numbers present and to the enthusiasm displayed. The dinners are always noteworthy for the many distinguished guests who accept invitations. In fact, it was stated last Friday that the Presidents of all the principal Engineering Institutions of the country were present. The toast list was not too long, and the witty speeches were interspersed with first-rate musical items. The toast submitted by Sir Alexander Gibb was that of "The Institution;" and he was followed by Mr. Loughman St. L. Pendred, who proposed "Transport and Industry," which was replied to by Major Theophilus Williams, Dock and Traffic Manager to the Port of London Authority. Among the guests (who were toasted at the call of Sir Alfred Baker, of the London County Council) was Mr. Stephen Lacey, President of The Institution of Gas Engineers; and Mr. H. T. Young, President of the Institution of Electrical Engineers, declared that nothing could give him greater delight than to respond for Mr. Lacey, as well as for the other guests, because whenever he had met him he had found him a most charming companion.

His health having been drunk to the accompaniment of musical honours, the President, Mr. Asa Binns, said he had been connected with the Institution of Engineers-in-Charge for very many years, and had got more out of it than he had put in. The zeal and enthusiasm of the officers and members of Council made the duties of the President exceedingly light. Of particular value was the work of the energetic Hon. Secretary, Captain Alfred E. Penn, in making arrangements for interesting Papers and visits.

It has been hinted that the speeches were punctuated by tale and anecdote. Which of the speakers was it that told the story of the little girl who said to her mother: "Mummy, will there be electric lighting in heaven?" To which the mother replied: "No, my dear. Electric lighting has to be installed by electrical engineers."

News in Brief

CURRENT EVENTS IN THE GAS INDUSTRY

The Index to the "JOURNAL" in respect of the quarter January-March, 1937, appears as a supplement to this issue.

For Public Lighting on the Powis housing estate the Aberdeen Town Council on April 5 agreed to gas instead of electricity.

Payment of Interim Dividend of 3½%, free of income-tax, in respect of the year ended June 30 next, on May 31 has been resolved by the Directors of the Oriental Gas Company.

"**Recent Developments in Grass Drying**" will be the subject of a lecture to be presented to the Royal Society of Arts on Wednesday, April 28, at 8.15 p.m. by Lieut.-Col. G. P. Pollitt, D.S.O., M.Sc., Ph.D., Director, Imperial Chemical Industries, Ltd.

An Order for extensions to the carbonizing plant has been placed by the Leamington Priors Gas Company with West's Gas Improvement Company, Ltd., who built the first section of the retort house in 1927 and erected the coke-handling plant in 1934.

An Increase of 14% in the gas output for the twelve months ended March 31, 1937, is shown by the Lincoln Gas Department. The output has risen by 90,144,000 cu.ft. from 634,716,000 cu.ft. to 724,860,000 cu.ft. The increase over the past two years is 26¾%.

We Learn from Mr. S. B. Dean, Engineer and Manager of the Gas Department of the Borough of Batley, that the Urban District Council of Birstall has now been incorporated in the Borough of Batley, and that in future Birstall Gas Department will be under the Batley Department.

Instead of the Present Discount, which is being discontinued, the Girvan Gas Company are making a reduction of 10d. per 1,000 cu.ft. on all gas in excess of 4,000 cu.ft. per quarter. In the case of slot meters a similar rebate will be allowed. The reductions take place as from the March meter readings.

For Sale by Tender the Directors of the Colchester Gas Company are offering an issue of £10,000 of 4% redeemable debenture stock, redeemable at par on March 31, 1957, at a minimum price of 98%. Tenders must be received before 11 a.m. on April 15. Further details will be found in our advertisement columns.

Sanction to Borrow £1,284 for steel mains and £23,640 and £14,410 for extensions at the Etruria Works has been given by the Ministry of Health to the Stoke-on-Trent Gas Department. The Gas Department have accepted the tender of West's Gas Improvement Company, Ltd., for the re-setting of four beds of vertical retorts.

To Cope with Increasing Demand, the Newcastle-under-Lyme Gas Committee reported to the Town Council last week that the Engineer and Manager, Mr. F. L. Wimhurst, had reported the urgency of installing additional plant at the Chesterton Works. A temporary addition of two settings of retorts was suggested as an extension to the carbonizing plant.

Cheap Gas was the sole inducement for the Kellogg Company of Great Britain, Ltd., the well-known cereal manufacturers, to build works at Trafford Park, Manchester, said Alderman Underwood at a meeting of the Dukinfield Town Council, when discussing the future of the Gas Industry. The factory will employ 3,000 people and will receive its gas supply from the Stretford and District Gas Board.

Industrial Co-Partnership Association announces employers and all others who are interested in the improvement of industrial relations are cordially invited to tea followed by a conference on "Co-Partnership in Industry" at Messrs. Boxfoldia, Ltd.'s, Works, Selly Oak, Birmingham, at 4.30 p.m. on Wednesday, April 21. The Bishop of Birmingham will preside, and the principal speakers will be Mr. Alan Colman, of the well-known Norwich firm, and Mr. Harry H. Payne, of Messrs. Harry H. Payne, Ltd., the multiple boot-repairers of Birmingham. Cards of admission may be obtained without fee from the Secretary, Industrial Co-Partnership Association, 36, Victoria Street, S.W. 1, or from Messrs. Boxfoldia, Ltd., Bournbrook, Birmingham.

Owing to Increased Housing Schemes Hereford City Council at their meeting on April 6 decided application be made to the Minister of Health for consent to the borrowing of £8,000 for new gas mains. The Engineer and Manager, Mr. Arthur Roberts, dealing with the proposed extension, reported that the estimated cost of laying mains at College Road and Withy Brook Estates was £5,450, and that the balance in hand on New Mains Capital Account was between £800 and £1,000.

A Further Issue of the *Cardiff Gas Review* fully maintains the high standard set by its predecessors, the present number containing many interesting features. Attention is drawn to the excellent year the Company experienced during 1936, when the gas sales increased by 29 million cu.ft., the number of consumers by 1,564, to 66,718, and the sales of appliances to £47,000. The Branch of the Women's Gas Council has also made admirable progress, the 500th member having been enrolled.

Cookery Demonstrations are now being given in the Labour Hall by the Cambridge University and Town Gas Light Company. Mr. G. E. H. Keillor (whose appointment is announced in our personal columns) undertook his first public duty as Sales Manager when he introduced Miss P. Condon, of the Radiation Research Kitchen, who gave the first of a series of demonstrations with a "New World" cooker. A feature of the demonstrations, which will continue until April 21, is the ever-popular cake-baking competition.

The Closing-Down of the Gas-Works is being considered by the Wigtown Town Council. The Gas-Works have been a heavy burden on the rates in past years and at May, 1936, the outstanding debt was £4,174. In the year 1934-35 the Town Council contributed £300 from rates and the following year £400. These sums did not cover the annual expenditure. The Town Council are to take a plebiscite of consumers and ratepayers as to whether they favour closing down. On the motion of ex-Provost Dyer, it was agreed to sign the plebiscite paper in favour of closing.

A Demonstration of gas appliances by actual cooking and sound films was opened at Accrington on April 5, organized by the Accrington District Gas Board. Demonstrations are also to be held at Whalley, Rishton, Great Harwood, and Clayton-le-Moors. The Mayor of Accrington (Alderman G. H. Ellis) performed the opening ceremony, Alderman J. Barlow, J.P., Chairman of the Board, presiding. The Mayor said the work of the Board (of which he was a member) was an important part of the town's activities, and rapid strides had been made, especially in regard to appliances. In the area served by the Board no fewer than 17,000 gas appliances were in use.

Amalgamation and Grouping

United Kingdom and Dukinfield.

We understand that the Dukinfield Corporation have disposed of the Municipal Gas-Works to the United Kingdom Gas Corporation for £80,530.

Hot Water for the Million

Ascot Installations at Ideal Home Exhibition

Members of the Industry and their friends were entertained by the Directors of the Ascot Gas Water Heater Company, Ltd., at the Ideal Home Exhibition on Tuesday evening, April 6, when parties of guests were conducted over several features of special interest. These included the Gas Light and Coke Company's stand, which is presenting a series of moving tableaux "starring" Ascot heaters on a revolving stage, the "Kitchens of the World" feature, and the "All-in" Home built by Davis Estates, Ltd. Though the ideal homes displayed in the Modern Housing section vary widely both in conception and practicability, it is interesting to note that of the ten buildings which comprise this exhibit, nine are constantly demonstrating hot water supplied by Ascot heaters.

At the "Ideal Home" Exhibition

38 WELBECK ST W1
FLAVELS OF LEAMINGTON
STOVE MAKERS SINCE 1777
VISIT THE WELBECK STREET FIREPLACE GALLERIES 30 WELBECK ST. W.1.
COKE FIRE

We are indebted to Messrs. Sidney Flavel for the above picture of their stand at the "Ideal Home" Exhibition. Exhibits were described in last week's issue.

Women's Gas Council

Second Annual Meeting.

A feature of the Second Annual Meeting of the Women's Gas Council to be held at Gas Industry House, 1, Grosvenor Place, S.W. 1, on Wednesday, April 21, will be an Address by Lady Ruth Balfour on "Right Feeding and its Preventative Aspects." The Chair will be taken by the Countess Jellicoe.

The meeting is timed to begin at four o'clock in the afternoon when tea will be taken; then will follow the business session and Lady Balfour's Address.

Visits to the "Ideal Home" Exhibition.

Visits to the "Ideal Home" Exhibition took place earlier in this week. On Monday a party consisting of 300 members of the Manchester, Cardiff, Harrogate, and Brighton, Hove, and Worthing branches visited the Exhibition; and on Wednesday, 150 members of the Wandsworth and District Home Service Association and the Southend branch visited Olympia to inspect the exhibits.

A further visit to the "Ideal Home" Exhibition will be paid on Wednesday, April 21, by 200 members of the Birmingham branch.

Demonstrators' Circle.

A meeting of the London and Home Counties Demonstrators' Circle will be held at 1, Grosvenor Place, S.W. 1, at 7.30 p.m. on Monday, April 19, when Miss F. Owen, B.Sc., will speak on diet.

A Sales Luncheon

Gas Executives Entertained

Gas executives were among the guests of Messrs. Tate & Co. (London), Ltd., and Tate & Co. (Utilities), Ltd., at a gas sales service luncheon on Wednesday, April 7, at the Clarendon Hotel, Hammersmith, W. 6. The chair was taken by Mr. A. P. Bunt, Managing Director, who welcomed the executives of the gas undertakings for whom his firm was working. During the past three months their net turnover had been as great as that during the first six months of last year.

In reply, Mr. R. W. Lowman, Gas Sales Manager, the Gas Light and Coke Company, expressed amazement at the growth of the organization during the past three years.

Mr. R. Tennyson-d'Eyncourt, of the Tottenham and District Gas Company, ably filled the breach occasioned by the absence of Mr. A. B. Seton, Gas Sales Manager, South Metropolitan Gas Company. Commander J. H. R. Homfray, Refrigerator Sales Manager, Electrolux, Ltd., paid tribute to the abilities of Mr. Bunt. The growth of Messrs. Tates, he emphasized amid applause, was due to one man; that man was Mr. Bunt. He had never hesitated to take a chance, and every success he had was thoroughly deserved. Mr. L. S. Hillson, General Manager, Tate & Co. (Utilities), Ltd., said it was indeed a great pleasure to work with the gas companies in the monopoly which they had been allowed to share.

In addition to the executives of gas undertakings the following firms were represented: Ascot Gas Water Heaters, Ltd., Bratt Colbran, Ltd., Electrolux, Ltd., Flavels, Ltd., Parkinson Stove Company, and Richmonds Gas Stove Company.

It is interesting to note that the firm have opened new premises at 70, High Street, Southampton, and 17, Highcross Street, Leicester, to sell "Electrolux" refrigerators in those areas.

The Institution of Gas Engineers

Membership Transferences

The Secretary of The Institution of Gas Engineers announces that the following membership transferences have been effected:

Transferred from Associate Membership to Membership:

HARMES, Edward Andrew, Civil and Constructional Engineer, Brighton, Hove, and Worthing Gas Company.

Transferred from Associateship to Associate Membership:

GOULD, Arthur Kempton, Assistant Manager, City of Waterford Gas Company.

Visit to the Engineering and Marine Exhibition.

The Engineering and Marine Exhibition, formerly the Shipping, Engineering, and Machinery Exhibition, incorporating the Foundry Trades' Exhibition and the Welding Exhibition, will be held at Olympia, W. 14, from Sept. 16 to Oct. 2, 1937. On the occasion of the customary Official Visit of The Institution of Gas Engineers to the Exhibition on Sept. 17 the Council of the Institution will be entertained by the Organizers of the Exhibition to luncheon and members will be invited to tea.

A Film Link-Up

This special window display was executed in the studio of the Parkinson Stove Company for use in the showrooms of the Stroud Gas Light and Coke Company by arrangement with Mr. W. Barber, Sales Manager. The link-up is with the film "His Lordship," and should prove very effective in conjunction with a special novel display of the "Renown" cooker in the foyer of the cinema where the film is shown.

London and Southern District Junior Gas Association

General Debate
Evening

Two subjects of considerable interest to the Industry were discussed by the London and Southern District Junior Gas Association at a meeting held at the London School of Hygiene and Tropical Medicine on Friday, March 19—the PRESIDENT (Mr. R. Summerson, of Luton) presiding. We published last week a report of one of the debates which concerned the gas engine ; below we conclude the debate.

LEAD AND IRON *versus* COPPER FOR SERVICE PIPES AND CARCASSING.

The Case for Lead and Iron Pipes.

Mr. J. H. M. GIBBONS (Croydon) opened the case in favour of lead and iron for service pipes and carcassing. The use of lead pipe for gas supplies, he observed, was not recommended for general use because of its liability to become obstructed by condensation, unless every precaution was taken to ensure that there was no possibility of sagging. Its place in gas supply practice was undoubtedly for the easy connection of meters with unions. It could be bent neatly into any desired shape to enable meters to be accommodated in what would otherwise be impracticable positions. It was essential that the flow of gas be impeded as little as possible at the points of entering and leaving the meter, and the smooth bore of lead pipe, together with the easy bends thereby obtainable, materially assisted towards that end.

In regard to iron pipes, said Mr. Gibbons, perhaps the principal points in its favour were that good quality pipe of this character used for internal work had satisfactorily withstood the test of years, under all sorts of conditions, while it had been proved that it could be used with safety in all sorts of soils, provided it was properly protected in those of an acidiferous nature. In view of the fact that gas supplies were frequently run underneath the floor it had the great advantage over copper of being practically impervious to the risk of leakages due to the entrance of nails and screws while floor boards were being laid. Moreover, its use never necessitated the services of a blow-lamp in order to make a gas-tight joint, with the attendant possibility of damage to property if the lamp were incorrectly operated.

Where gas supplies had to be run on the surface iron pipe in the hands of a good gasfitter could be made into a neat and effectual job. The number of fittings utilized could be kept to a minimum by setting the pipe where indicated. Where fittings were necessary they conformed approximately to the same size and were the same finish as the pipe; they did not, therefore, necessarily present an uneven appearance. In the smaller sizes normally used for domestic work the difference in the external diameter between iron and copper tubing of the same nominal bore was hardly noticeable—as would be seen from the following table:

Nominal Bore.	External Diameter.	
	Iron.	Light Gauge Copper Tubing.
½ in.	0·84 in.	0·596 in.
¾ ,,	1·063 ,,	0·846 ,,
1 ,,	1·345 ,,	1·112 ,,
1¼ ,,	1·69 ,,	1·362 ,,
1½ ,,	1·91 ,,	1·612 ,,

It had been said, went on Mr. Gibbons, that iron tubing was more liable to corrosion than copper; but against that he would point out that it did not get disfigured so quickly nor so badly, due to the composition of the air normally found in houses. It was necessary, therefore, to paint both forms of piping—in the case of iron to give conformity of appearance with its surroundings, and in the case of copper in order to maintain appearance without excessive cleaning.

In Mr. Gibbons' opinion copper tubing should never be used for hot water work in cases where there was a galvanized iron tank already installed, because no matter what precautions were laid down on paper for avoiding the probability of galvanic action in such circumstances, there was always the risk that these would not be carried out in practice. There was, therefore, a real danger of leaks occurring as a result of copper piping being utilized in conjunction with galvanized tanks. If copper was to be used at all it would necessarily mean equipping fitters with tools additional to their already comprehensive kit.

Perhaps one of the greatest practical objections to the use of copper pipe in running gas and water supplies, went on Mr. Gibbons, was its cost. Although it was generally agreed that the labour costs of identical jobs carried out in iron and copper favoured the latter, the greater cost of material more than offset any saving on this score. Some time ago—before the present copper boom—Mr. Gibbons' Company went into this question of comparative costs and found that in order to do the same job single-handed by copper and iron the ratio was 1 to 1·4 in favour of iron. He also noticed that in the discussion on a Paper by Mr. Barker, of the Nairn Gas Company, on Sept. 10 last, Mr. Lacey stated that a test of carcassing three flats had shown the following figures:

	£	s.	d.
Mild steel	1	14	1
Copper (fitter and mate)	2	11	1
Copper (fitter alone)	2	6	10

These figures showed ratios of 1 to 1·5 and 1 to 1·37 in favour of mild steel, which were very near to his Company's findings.

He therefore maintained that for connecting small meters lead was the easiest and most satisfactory material—and appearance could not be taken into consideration as such connections were usually out of sight. Mr. Gibbons further suggested that good quality iron piping had much to commend it in comparison with copper for general carcassing work, particularly from the viewpoint of safety of installation, and that the use of copper for hot water work in conjunction with galvanized iron tanks could not be condoned, as it placed too great a responsibility on the fitter. Coupled with the foregoing was the fact that iron installations were a very much more economical proposition when compared with copper.

The Case for Copper Piping.

Mr. S. F. DUNKLEY (Gas Light and Coke Company) took the other view and drew attention to the advantages of copper over wrought iron, mild steel, and lead. Copper, he remarked, was known to have been in use for over 6,000 years. Relics found in Egypt dated back to 4,000 B.C., while a sample of copper water pipe dating back to 2,700 B.C. could be found in the Berlin Museum. There was a plentiful world supply of copper, but financial interests in recent years appeared to have mitigated against its growth and more general adoption. Towards the end of the 18th century Great Britain was the largest producing country, Swansea being the refining centre. The largest producing countries at the present time were the U.S.A., Chili, Japan, Spain, Portugal, Russia, Canada, and Rhodesia. To this day copper still remained one of the most important of the commoner metals, as evidenced by the recent gambling on the Metal Market. Demand and output had been rapidly increasing for all purposes since 1923, and until this recent setback prices had fallen proportionally with increased output. Prices were in the future expected to fall again very rapidly.

Why, asked Mr. Dunkley, was there this heavy and growing demand for copper in all industries? To him it was easy to see. Copper in particular,-together with many of its alloys, had the necessary essential of cheapness combined with the ideal chemical, physical, and mechanical properties. Its thermal conductivity was second only to silver and about seven times as great as iron and steel, making its use desirable for water heaters, calorifiers, and the like. It was in its annealed condition a particularly soft metal, enabling it to be severely bent or deformed without damage. This high degree of ductility and malleability enabled it to be hardened to any desired degree by cold working and drawing. It was a strong metal even in its soft condition, but its strength could be greatly increased by cold working without any deleterious effect—a most important point.

Copper's high resistance to corrosion is exemplified by the numerous antiques which have survived thousands of years and which were still in an excellent state of preservation. The roofs of many old public buildings also gave ample proof of this. Copper was, as Mr. Dunkley termed it, self-protective: a very thin and adhesive oxide film which forms rapidly being sufficient to protect it against further attacks. Lead—one of the other metals they were considering—had this property to a much smaller degree as well as many other disadvantages. Copper was a particularly easy metal to solder and braze or weld—a most important point in any engineering process. Of all the commercial metals copper was ideal as a base for the electro-deposition of metals, including nickel and chromium,

and also a most suitable surface to treat with paint, giving a much longer life to even a single film of paint.

The combined good properties of copper, emphasized Mr. Dunkley, enabled it—in spite of its higher initial cost—to be used with advantage over and at a lower cost than many of its competitors. Its greatly increased strength and rigidity as a result of cold working, combined with its high resistance to corrosion, permitted of much lighter gauge metal being used than was possible with alternative metals.

The use of copper in the gas, water, and electrical industries, owing to its ideal properties, had long been established, and was now accepted as the ideal for both the installation carcass and for use in the appliances themselves. Its use for gas, and more particularly water, carcasses had increased very rapidly in recent years in nearly all the more progressive countries in the world. In America the output of light gauge copper tubes had increased from 100 tons in 1920 to 15,000 tons in 1936, or the equivalent of 75,000,000 ft. per annum. In Great Britain light gauge copper tubes were practically unknown; in 1931 their use was negligible; in 1936 the output had risen to 6,000 tons, or the equivalent of 30,000,000 ft. per annum. The reason for this rapid growth in its use as light gauge tubing appeared to coincide with the introduction of extremely neat, sound, and cheap joints and fittings and the production of light and simple tools for manipulation.

Mr. Dunkley went on to refer to the various methods of jointing which could be applied to copper tubing—the die cut threaded joint, which was only suitable for heavy gauge tubing; brazed and welded joints, which did not show any saving in labour or material, and were more suitable for very large diameter pipes; compression joints, the original type of joint that made possible the use of light gauge copper tube, but the previous lack of standardization of outside diameter as well as poor appearance and high cost had prevented its more general adoption, as well as the tendency to draw through expansion, contraction, and vibration; capillary soldered joint, which was rapidly growing in popularity by reason of its extreme neatness and cheapness, while with ordinary care in making, the joint was stronger than the tube; and finally, the rolled thread joint, which was a promising joint used in Germany.

As regards bending tools, it was sufficient to say that there was at present a plentiful supply of extremely light and portable benders available, capable of giving perfect and undistorted bends of all types. In conclusion, Mr. Dunkley summarized the advantages of copper tubing as follows: Reduced installation cost; so long as copper was at its normal market price of £35 per ton, or below £45 per ton, it was cheaper than steel and much cheaper than lead. Less time for installation—an important factor during heavy seasonal demands. The simplicity of modern jointing methods and the displacement eventually of special cutting and screwing equipment. Cleanliness in working, giving more contented workmen. Much neater appearance. Fewer joints, due to bendability of tube. No maintenance or replacement due to absence of internal and external corrosion. Decreased transport and storage costs, and space required. Ease of estimating job costs. And ease of training fitters.

Discussion.

In the course of the general discussion which followed the advantages of the use of copper tubing from the viewpoint of training gasfitters was stressed, it being stated that the time taken in teaching craftsmen pipe setting left no basis for comparison on this score. For meter fitting both in the U.S.A. and on the Continent the use of lead had been discontinued entirely; in the former country the meter bar was utilized. Light gauge copper tubing could be obtained in every form from very soft in coils to very hard which had all the advantages of steel tubing. On the grounds of appearance, if the tubing was left unpainted even then copper still scored; but they did not generally leave it unfinished. It was usually either rendered in chromium plate or painted; if it was left with a high gloss its appearance was excellent. It was suggested that the trouble in regard to the use of copper pipe with galvanized iron tanks could be overcome by taking an iron connection from the tank and connecting that to the copper pipes.

In reference to Mr. Gibbons' suggestion that the smooth surface of lead pipe facilitated the flow of gas, it was observed that the co-efficient of friction could be plotted against the Reynolds number, and if they took a length of lead pipe and another of copper and considered the same fluid passing through at the same velocity it was doubtful if the most sensitive method would discover any difference in the flow; therefore the suggestion that a smooth pipe made any difference in the flow was inaccurate. Then, Mr. Gibbons had stated that steel was non-corrodible; this was not a fact, it was stated. Both steel and wrought iron corroded in certain soils, and both steel and wrought iron service pipes had to be suitably protected. As regards the use of copper with galvanized iron tanks, it was stated that zinc and copper were widely separated on the scale, and, as a result, an electro-motive force was set up. The water itself had something to do with it. It was stated that the high conductivity of copper was unimportant in practice. They were concerned in water heaters with the transfer of heat, and it did not matter what the conductivity of the metal was, because throughout the whole range of metals the difference in conductivity was so small that it would have only a relatively small effect. It was suggested that neither Mr. Gibbons nor Mr. Dunkley was entirely right, for they could not carry on exclusively with copper or steel or lead; there were applications in the Industry for all three metals. It was considered, however, that they should use copper more for service work with a leaning towards Mr. Dunkley's view that they would in time be using more copper.

The advantages of copper from the advertising viewpoint was stressed by another member, because copper helped the fitter to carry out neat and clean installation work. The difficulties experienced in the use of copper for oil and water pipes on engines and boilers were referred to in connection with the liability of the joints to break down. All those who used copper tubing in such circumstances adopted the compression joint without a moment's thought, which looked as if the district people were starting where the engineers stopped years ago. The question of the deterioration of copper tubing in storage was also mentioned. Another member took Mr. Dunkley to task for suggesting that copper was cheaper than iron, and said that this could not be supported by facts. He did not think any gas undertaking could afford to bury copper pipe in the ground, though it was all right for carcassing work. It was also suggested that the public were becoming more copper-minded as a result of its use by plumbers, and its use was often an important factor in obtaining an order. It was something new, and it would catch on.

In reply to a question in regard to the possibility of paint flaking off copper, it was stated that this should not occur if the pipe was properly cleaned before application. Flaking was due to grease on the pipe. The danger of using a blow-lamp under the floor for jointing was mentioned in connection with the utilization of copper tubing. Compression joints, it was stated, were ugly, while it was considered that they would be more expensive. In reference to the statement that copper could be obtained in varying degrees of hardness, it was asked whether it was sufficiently hard to withstand accidental blows such as it might receive underground from picks. The low melting point of copper in the event of fire was another point brought out.

Mr. Gibbons and Mr. Dunkley briefly replied to the various points raised in the course of the discussion, and in connection with jointing the latter reiterated that the capillary joint was cheaper than the compression. As regards boiler work they did not use capillary joints but simply relied on the tensile strength of the solder. As regards galvanic action he had had occasion to examine a number of tanks which had been turned out from one estate where copper tubing had been employed; on an adjacent estate a similar number of tanks had been turned out where there had not been a single copper pipe in any of the houses. Despite this, however, plumbers were still buying copper at £73 per ton. The British Standards Institution, added Mr. Dunkley, had standardized light gauge copper cylinders and tanks, while in addition to that they had standardized the diameter of the tubes for both water and gas with a view to facilitating their use.

Oxley Engineering Company, Ltd.

Public Issue

A public issue will be made on Friday, April 16, of 400,000 Ordinary Shares of 5s. each at par in Oxley Engineering Company, Ltd.

The Company acquires as from Jan. 1, 1937, a business founded in 1895, specializing in the manufacture and erection of electrically-welded purifiers, spirally-guided gasholders, and storage tanks. The exclusive rights for the United Kingdom of the well-known "Hollis" patents are vested in the Company, and by means of the portable welding plant extensive repair work can be carried out in addition to manufacture. Contracts in hand for the supply of gasholders and storage tanks and equipment for municipal authorities and leading gas and oil companies amount to the value of over £200,000, and the Directors state that these should ensure profits in excess of a sum equivalent to over 18% on the issue price of the shares.

Hoodoo from Halifax

The Walking Dead

The truth of Shakespeare's "how many things by season, seasoned are" is rather amusingly endorsed in a "good one" for which we are indebted to Mr. W. B. McLusky, Engineer and Manager of the Halifax Gas Department, who sends us a cutting from the *Halifax Daily Courier and Guardian* for April 7, which runs, "In a recent note in this column reference was made to the ghostly appearance which some of the new forms of street lighting give to the human countenance. Here is a story of an incident which happened in another town where sodium lighting has been introduced. In a thoroughfare so lighted, two friends met the other evening, and one said he was going to the cinema to see 'The Walking Dead.' 'Huh,' replied the other, 'you look as though you were going to join them!'"

North British Association of Gas Managers

Spring Meeting in Edinburgh.

The Spring Meeting of the North British Association of Gas Managers was held at the North British Station Hotel, Edinburgh, on April 9, under the Presidency of Mr. JAMES JAMIESON, of Edinburgh.

The PRESIDENT intimated that Lord Provost L. Gumley, of Edinburgh, who had intended to welcome them, was detained in London by important business. They had, however, an excellent substitute in the Senior Magistrate of the City, Bailie J. R. Coltart, who had come to address a few words to them.

Bailie COLTART said he had to convey the apologies and good wishes of the Lord Provost, who would have liked to welcome them personally. It was work of great importance that had detained him in London. Continuing, Bailie Coltart mentioned that the amount of gas consumed in the British Isles during 1936 reached the new high figure of 342,000 million cu.ft., which was an increase of 10,000 million cu.ft., equal to 3%. In the same period consumers increased by 247,000 to a total of 11,500,000. The increase represented considerable work and enterprise on the part of gas undertakings everywhere. Nearly a quarter of a million people—and, in fact, it represented many more persons than that—had been able during last year to take advantage for the first time of gas. The general revival in trade had been partly responsible, but the Gas Industry had put itself in a position to meet the demand and had made its scale of charges applicable to industry in general. He took the opportunity of complimenting their President on the admirable work done in Edinburgh under his skilful and able leadership. It was quite unnecessary for him to tell them of what Mr. Jamieson had done for the Gas Industry. He was the sixth Edinburgh Gas Engineer to occupy the Chair of their Association.

The PRESIDENT, in reply, said that this was the 23rd time the Association had met in Edinburgh. That was no mere coincidence; it was clear indication that a visit to Edinburgh was always popular, whether it was for business purposes or on pleasure bent. He thanked Bailie Coltart for the references he had made to him and to the Department. He assured him he was appreciative of the many kindnesses which Bailie Coltart and his colleagues had at all times shown.

Losses by Death.

The PRESIDENT then referred to the death of two Members, Mr. Walter Wilson, of Stewarton, and Mr. Jas. Riddell, of Glasgow. Mr. Wilson, he said, was probably not widely known, but he had been an active member of the Association for many years, and they greatly regretted his passing. Mr. Riddell, on the other hand, was widely known and he rarely missed a meeting of the Association. His sudden and tragic death was a great blow to Mr. Jamieson personally, as he died when about to leave Glasgow to keep an appointment with him in Edinburgh.

Mr. Walter Wilson, who died on November 17, 1936, became a member of the Association in 1921 following his appointment at Stewarton. He was esteemed by the Directors of the Gas Company and by the community at Stewarton.

Mr. James Riddell had been an extraordinary member of the Association since 1923 and had a long connection with the Gas Industry. Commencing his career with Glasgow Corporation, he entered the coal trade, ultimately starting on his own account. He built up a strong connection with Scottish gas undertakings, and his sudden death on Jan. 25 was much regretted by a wide circle of friends and acquaintances.

Presidential Address.

Mr. Jamieson then delivered his Presidential Address. This, together with the vote of thanks, will be found on other pages of to-day's "JOURNAL."

Nominations were received for the Ballot list for the election of Members of Council at the Annual General Meeting, the following being nominated: Messrs. R. Fife, Kilmarnock; A. Jamieson, Johnstone; P. Low, Elgin; and J. M. Ireland, Carnoustie.

Following the meeting the company sat down to lunch in the North British Station Hotel.

Luncheon Speeches.

Mr. A. S. NISBET (Paisley) proposed the toast of "The City and Royal Burgh of Edinburgh." He referred to the place of Edinburgh in the world of art, literature, architecture, and history. He associated the toast with the name of Bailie Coltart.

Bailie COLTART, in response, said they were proud of Edinburgh and of its sons. He thanked Mr. Nisbet for proposing the toast.

Councillor WALTER MUTER, J.P., proposing the toast of "The North British Association of Gas Managers," said it had its origin in a meeting of four gas managers in Cupar, Fife, in January, 1862. It was a casual meeting and out of it grew this great organization. Their first meeting as an organization was on July 30, 1862, when 20 gas managers were present. The only business was the framing and drafting of rules, and these were so well designed and drafted that they remained substantially unchanged till 1909. No records were available between 1862 and 1867. The Association had its imitators and a Scottish Association of Gas Managers was formed, which was united with their body in 1866. It was not till 1872 that West of Scotland managers recognized the benefits of organization, and an Association came into being that year for managers of works with an annual output of not more than 30 million cu.ft., this Association later being happily married to their own organization. The first President from the East of Scotland was John Reid, of Leith, who held office in 1868, and since then Edinburgh had made a notable contribution towards the fashioning of their Association.

Messrs. H. A. Aitken, A. S. Nisbet, and G. Braidwood, who took leading parts in an excellent meeting.

Mr. Jamieson, said Councillor Muter, had that day given them such a call to service as well might be copied in other industries. With undue modesty, Mr. Jamieson had hidden his gas-light beneath the proverbial bushel. It was only now that he was letting their friends in the South know that Edinburgh was holding its own and even setting the pace, so far as the Gas Industry was concerned. It was an incentive to others to buckle to their jobs. If ever challenging words were uttered to any Industry they were spoken that day by their President. He had indicated the need for combination and co-operation in the service of their consumers if the Industry was to survive its present difficulties. There was a false spirit of complacency abroad. They had to meet the competition of oil, electricity, and other sources of light and heat, and no parochial spirit should stand in their way. In Edinburgh their progress was due to the skilful leadership and management of their Presi-

dent. Moreover, no political considerations had ever been allowed to enter their committee-rooms. It was to be deplored that in great industries like gas, electricity, and transport, decisions were affected by political influences. Scotland was not free from this, and England was cursed with it. Business considerations alone should count in their decisions.

Mr. Jamieson, continued Councillor Muter, had referred to the coal position. The Gas Industry had reason to be keenly disappointed with the inaction of Government and with the attitude of coalowners as a whole. For some obscure reason the Scottish Secretary on the coalowners' side resided in England, and difficulty was therefore experienced in arranging meetings. He wished deliberately to charge the coal industry of this country not only with grave equivocation in this matter but with a failure to meet the issue. One important colliery owner had said that the gas and electricity undertakings of this country had been obtaining their coal at less than cost price. If this were true, it was a piece of bad business. But it was not true. Latterly the Gas Industry had been paying 100% more for its coal than in pre-war days. He wanted to address certain words to the people in the coal trade. They had been promised

The President, with the Hon. Secretary, Mr. A. Kellock, and Mr. D. D. Melvin, Chief Assistant at Edinburgh.

legislation, protection, and representation. They had received none of these things. The Gas Industry, like all other great public utilities, would need to act co-operatively. They would not influence Parliament and their respective members till they made them squeal. The National Gas Council had been far too respectable. The Department of Mines had failed signally in its duty to the public. The Government and the coal-owners told them to pass on the increase to their consumers, which meant they had to live on their own tail. The consumer was already paying through the nose for his raw coal. Sir Robert Horne was pleading for a subsidy for the export side of the coal trade, but every public utility undertaking was already subsidizing the export of coal.

Councillor Muter said he was not a complete apostle of hopelessness. With gas engineers, managers, directors, and municipal representatives co-operating, the future was full of hope. They had a great opportunity for a confraternity of spirit that should be the birthright of every association and of every free man. He coupled the toast with the name of Mr. Jamieson, to whom they were all endeared and indebted.

Mr. JAMIESON, replying, said he could not adequately thank Councillor Muter for his kind references to himself. He appreciated the tribute paid to the Association and to the Industry as a whole. His words reminded him of the time when Councillor Muter so ably filled the Chair of the British Commercial Gas Association. As gas managers they were not competing with each other but had their own allotted ground to cover. They were therefore able to get together to solve their common problems.

Mr. JAMES DICKSON (Kirkintilloch) proposed the toast of "The Guests," paying tribute to the work done in Edinburgh and elsewhere for the Industry by Mr. Jamieson and by Councillor Muter.

Councillor DUNCAN, Convener of the Edinburgh Corporation Gas Committee, replied, Mr. DAVID FULTON (Helensburgh) proposing a vote of thanks to the Chairman.

Members of the Association thereafter visited Granton Gas-Works.

Visit to Granton Gas-Works.

In the afternoon the members visited the Edinburgh Corporation Gas-Works at Granton, where they were received by Councillor Duncan, Convener of the Gas Sub-Committee, and Mr. Jamieson.

In the course of their tour, the visitors saw the new vertical retorts which are being installed, at a cost of £75,000, and which it is hoped will be in operation next winter. Their output will be 4½ million cu.ft. per day. They also saw the de-tarring plant in operation. Only recently installed, this is the first of its kind in Scotland.

The Holmes benzole plant, to the results from which the President made extended reference in his Address, came in for much attention.

Among the other additions at Granton inspected during the afternoon was a coke grading apparatus, in course of erection. When completed this will screen, grade, and bag coke at the rate of a bag a second. The visitors inspected the research work which has been carried out, in conjunction with the Fuel Research Board, on the effects of weathering on coal. These experiments have been going on for three years. It is expected that a report on this investigation will be issued at an early date.

Before leaving the visitors were entertained at tea.

Results of Golf Competition.

J. Winson Scott Silver Cup—S. Hall, Edinburgh.

HANDICAP PRIZES.

Section I. (Handicaps up to and including 9)—

Tie	1st	S. Bennet, Edinburgh
	2nd	M. Thornton, London
	3rd	J. Pollock, Glasgow
	4th	H. Rule, Stirling

Section II. (Handicaps over 9)—

	1st	S. Hall, Edinburgh
	2nd	A. Young, Edinburgh
	3rd	J. Bell, Dumbarton
Tie	4th	J. D. Couper, Glasgow
	5th	G. A. Mitchell, Glasgow

The prizes were presented by Mr. James Jamieson, President of the Association.

Gas Undertakings' Results

Bridgwater.

The report of the Directors of the Bridgwater Gas Light Company, for the year ended Dec. 31, 1936, states that the sale of gas showed an increase of about 8,900,000 cu.ft. or 5·87%. The addition of 150 new customers during the year brings the total to 5,272. The sales of gas also show a small average increase per customer. In the fittings and appliances department, the most notable increase is in water heaters, the number issued being double of that for the preceding year. A new 8-in. main from the Works to the Bath Road has already been laid, and new compressing plant is being installed at the Works. The usual final dividend was paid on April 1, and £30 was carried to the reserve fund, and the remaining balance carried forward to next year's accounts.

United Kingdom.

The report of the Directors of the United Kingdom Gas Corporation, Ltd., for the year ended Dec. 31, 1936, states that the net revenue for the year, after providing for income-tax, interest, and other expenses, amounted to £87,829; to this must be added the balance brought forward from last year of £5,360, making £93,189. Out of this sum the following dividends have been paid or provided for: On 4½% cumulative preference shares to Dec. 31, 1936 (less income-tax), £31,025, on 4½% preferred ordinary shares to June 30, 1936 (less income-tax), £5,666, and interim dividend of 2% on ordinary shares on account of the year to Dec. 31, 1936 (less income-tax), £11,438, leaving £45,060. The Directors have applied the sum of £10,000: To writing off Commission payable under financial advisers' agreement, £8,151, and to writing down stamp duty and expenses of increase of capital, £1,849, leaving a net amount of £35,060, which the Directors recommend should be appropriated as follows: To payment of a dividend on the preferred ordinary shares (now called second non-cumulative preference shares) at the rate of 4½% per annum for the half-year to Dec. 31, 1936, less income-tax, £8,131, and to payment of a final dividend of 3% on the ordinary shares (making a total of 5%) for the year to Dec. 31, 1936, less income-tax, £17,156, leaving to be carried forward £9,773. The revenue includes dividends and interest from Subsidiary Companies of which £18,583 is applicable to periods prior to the date of acquisition of the Corporation's holdings in such Subsidiaries. The Directors have accordingly written off £18,583 from the cost of investments in Subsidiary Companies out of the premiums on issue of shares.

(*Further Gas Undertakings' Results see p.* 112.)

NORTH BRITISH ASSOCIATION

OF GAS MANAGERS

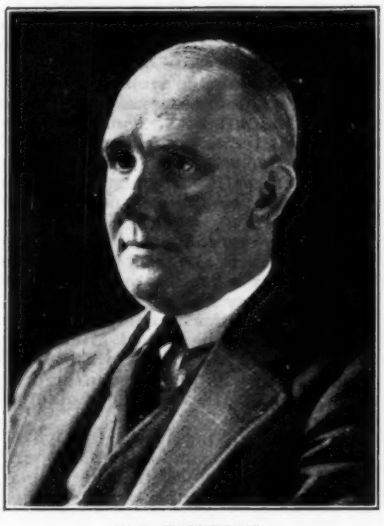
Presidential Address

OF

JAMES JAMIESON

(Engineer and Manager of the Edinburgh Corporation Gas Department

Presented at the Spring General Meeting of the Association held at Edinburgh on Friday, April 9.



THE PRESIDENT.

Mr. James Jamieson, after completing his practical training, joined his father at Thornliebank, ultimately succeeding him as Manager. Successively, his grandfather, father, and himself managed this concern. He was transferred to the Dalmarnock Station of the Glasgow Corporation on their acquiring this undertaking. Mr. Jamieson has held appointments as Assistant Engineer and Manager to the Dunfermline Gas Commissioners and Greenock Corporation Gas Department, and for twelve years was Assistant Engineer and Manager at Edinburgh before being appointed Engineer and Manager in 1933. He is a Past-President of the Scottish Junior Gas Association (Western District) and the Waverley Association of Gas Managers, and was joint author of a Paper before The Institution of Gas Engineers at their last Annual Meeting.

I deeply appreciate the honour of being elected President of this Association in a year which promises to be outstanding in the history of our Industry.

The Gas Industry may well be satisfied with the results for 1936. Sales of gas and appliances have reached record figures, the increase in some of the more prosperous concerns being unprecedented. Coke or smokeless fuel for both land sale and export has been at a premium, and while the tar market has been restricted the demand for creosote has prevented what might otherwise have been a black spot in our trading account.

There appears therefore to be some justification for that quiet tone of optimism noticeable recently, a tone which has been sadly lacking in recent years. One hears it openly stated that the Gas Industry has emerged from the world slump with credit not only to itself but to the country as a whole. With that record behind us advantage should be taken of the opportunity to push home our undoubted claims for a legitimate share of the new business likely to arise from the greater activity in the industrial markets throughout the country.

It is true that to-day gas is not a luxury, it is a necessity in the homes of the people. For space heating and water heating, for cooking and refrigeration in the modern house gas has no economic nor reliable competitor. In industry gaseous fuel has already established itself, but it is safe to say the fringe of the business has hardly been touched. There is therefore much work ahead of us, work involving scientific investigation and careful planning if we are to reap the harvest which is lying ripe for us. But courage and enterprise above the average are necessary if the problem is to be successfully handled. I am confident this will not be lacking in the gas age which is before us.

Coal Position.

Public utilities generally and in particular the Gas Industry can only view with the gravest apprehension the granting by the Government to the coal industry of an uncontrolled monopoly. Since the earliest days of monopolies safeguards for the consuming public have been insisted upon. Statutory gas companies' dividends are governed by the price at which the commodity is supplied. Restrictions on the raising of capital, the building of reserves, and depreciation of plant have been applied as an additional protection for the consumer. Last year when the South Metropolitan Gas Company proposed to alter their method of charge without adding materially to the revenue of the Company a public outcry resulted, the intensity of which compelled the Company to defer the change.

At the same time the colliery owners were not only receiving a voluntary 1s. per ton on outstanding coal contracts but were raising prices for new contracts not to the domestic user alone but to public utilities and industrial users generally. Although protests equally as strong as those in the case of the South Metropolitan Gas Company have been made the Government so far have felt it unnecessary to institute any form of control.

The Danger of an Uncontrolled Monopoly.

An uncontrolled monopoly is not only a danger to itself; it is a danger to the country as a whole. Gas company stock varies little with the market fluctuations which take place from time to time, rising and falling as a rule with Government Loans and gilt-edged securities. That is what one might expect from the operation of a controlled monopoly and demonstrates that the legislation provided has been effective in safeguarding the consumer. On the other hand, if we look at the reaction of colliery shares following the introduction of the Coal Mines Act we get an insight into the operation of an uncontrolled monopoly. Shares in some companies have advanced as much as 300%, stock which formerly was hardly marketable began to change hands at inflated values, and dividends in most companies have been substantially increased. Notwithstanding these favourable circumstances further additional imposts of a revolutionary character not only in price but in conditions of contracts have been imposed upon coal users.

In this country coal is our only source of heat and power, both of which are essential to the welfare of the community. On that account a great trust has been placed on those administering the Coal Industry, a trust which if abused may have serious repercussions. To be granted complete and unquestioned control over a commodity upon which the industrial and domestic life of this country depends carries with it great responsibilities. Is it too much to expect that these responsibilities will be discharged with wisdom and justice?

Price of Coal.

The Gas Industry has always paid a reasonable price for its coal. Indeed, looking back over a period of years, one is tempted to suggest that the price was above the average. To-day we are paying for screened coal over 100% more than the pre-war price. We do not desire to have underpaid miners, nor do we deny the shareholders in well managed and efficient collieries a reasonable return on their capital, but as a controlled public utility we cannot afford to subsidize inefficient production of our basic raw material. To the Gas Industry coal is vital, but it is equally vital that the coal should be reasonably cheap and clean, and that deliveries should be at all times assured. We have a statutory obligation to supply gas in such quantities and at such times as our consumers require it. Night and day it has to be on tap if required. In normal circumstances the output of gas in winter is double that required in summer. Like the Coal Industry, we would much prefer

an even load throughout the year. Unlike the Coal Industry, we have no control over output and we are compelled by Statute to maintain supplies no matter how exacting may be the demand. In that respect the Gas Industry is at a disadvantage, and it is a point which may have to be stressed at no distant date. In negotiating recent contracts colliery companies have been introducing conditions which are totally unacceptable to our Industry. I refer to the equal monthly delivery clause, the acceptance of colliery weights as final and binding, and coupled with these a time limit on contracts. These conditions must not only be opposed, they must be rejected in no uncertain manner.

Shortage of Coal Supplies.

At a recent meeting of the Edinburgh City business club Mr. D. S. Alexander, of the Coal Utilisation Council, is reported to have said:

> "The problem to-day is to increase the consumption of coal, and it is with that end in view that the Coal Industry has voluntarily set up and is voluntarily financing the Council."

The solution of the coal problem is one which has been entrusted to the colliery owners, but when a statement is made that increased consumption is necessary at a time when industry is short of, and, indeed, gasping for, supplies and accepting qualities which in normal times would not only be rejected but would be returned to the collieries, surely Mr. Alexander's statement requires amplification. During the past four winter months we have been short of our contracted quantities to the extent of 20,000 tons. The colliery owners were advised of our monthly requirements as early as Sept. 1. If supplies were available why were contracts not implemented? We had a similar experience the previous year, and the position must be clarified before we face another winter. Is there an actual shortage of coal during the winter months, and if so how far are quotas responsible for the shortage and what steps have been taken to have the position rectified? The Gas Industry must have freshly wrought coal if a curtailment of supply is to be avoided and the statutory declared quality of gas maintained. On that account an early answer to my question should be forthcoming. If the Coal Industry of this country cannot meet these requirements we should be informed in order that the position might be examined by the appropriate Government Department. A repetition of the past two winters in Edinburgh would be much too dangerous to contemplate.

Quality of Coal.

With the shortage of supplies the quality of coal delivered against contract has deteriorated appreciably. We have been compelled to accept grades and sizes of coal which are not only inferior but in many cases quite unsuitable for our purpose without any compensating reduction on the contract price. We have been told that if we did not accept it others would, and in any case it was the best available. To have coal supplied containing roofing, stones, bats, &c., to the extent of 6% of the total weight and to be helpless in combating it is not an enviable position for the management of any undertaking. How long would this be tolerated under competitive conditions? Under existing conditions I doubt if it will be tolerated much longer.

Methods such as these are not creditable to what after all is our basic Industry. Appeals to the Government have so far failed, but action must be taken soon if the economic position of this country is not to be endangered. One thing is certain; whatever action may ultimately be taken, it will be taken all the more quickly if all users of coal co-operate in making an effective protest.

This brings me to the general subject of co-operation in the Gas Industry.

Co-operation in the Scottish Gas Industry.

I had first-hand information recently from a member of the Industry who had just visited Ireland of the state of the Gas Industry in that country. He said that while the Industry appears to continue to prosper in the larger centres of population, in many of the rural communities it is practically derelict. To what extent this is true, I cannot say, but the *Gas World* Year Book for 1937 shows 70 Undertakings, as against 84 in 1931, and the words "works closed" appear in the intervening years against the names of quite a number of small works. In any case, my informant, basing his views on personal observation, is of the opinion that the rural Gas Industry in Ireland is doomed.

I do not propose to go into the reasons of that here. What I am concerned with is the fact that the same ominous words "works closed" are beginning to appear in the Scottish statistics as well. What we must seriously ask ourselves is whether the Gas Industry in Rural Scotland is destined to share the same fate as has been predicted for Ireland. It is a state of affairs which even the larger undertakings cannot view with equanimity, because it will be difficult to keep the population gas-minded if the Gas Industry is restricted to a comparatively small area of the country, a state of affairs we as a national industry must take all possible steps to prevent. It may be that there are isolated cases of small works which, owing to special circumstances, cannot produce gas at competitive prices, but, on the other hand, it has been amply demonstrated that some small works efficiently managed can produce gas cheaply enough to compete with other fuels. Nevertheless, the small undertaking frequently is handicapped by lack of funds with which to finance improvements in production and new methods of sales promotion, and it is the duty of the Industry as a whole to devise means whereby these disabilities of the smaller undertakings may be removed.

I do not pretend to offer a complete solution of the problem, which may only be solved after many years of trial and error. What I do suggest, however, is that we take steps immediately to review and improve our co-operative organization, with the object of organizing our Industry on national lines.

Any such review would inevitably involve a consideration of physical amalgamation of adjacent undertakings. Whether the linking up of adjacent undertakings by distribution mains is profitable is generally a question of fact in each individual instance, the cost of the mains being as a rule the deciding factor. In many cases a gas grid is not a paying proposition, but it is very doubtful whether we in Scotland have gone far enough in this direction.

Amalgamation and Purchase of Gas Undertakings.

In Edinburgh we are doing what we can. It is now many years since Edinburgh, Leith, Corstorphine, and Portobello became one Undertaking, Portobello being acquired by the Edinburgh Undertaking to complete the amalgamation in 1896. These towns and villages, formerly independent, are now all part of Greater Edinburgh, and from 1896 until 1934 the expansion of the area of gas supply has been coincident with the expansion of the city, there being then only one small area (Balerno) outside the city boundaries supplied by the Edinburgh Undertaking. In 1934 an agreement was entered into for the supply of gas in bulk to the Broxburn Undertaking, thus carrying the Edinburgh gas supply four miles west of the City boundary and eleven miles from Granton Works. *Apropos* this transaction and to illustrate certain of the difficulties inherent in the acquisition of other undertakings, I may mention that negotiations for the purchase of the Broxburn Undertaking by the Edinburgh Corporation were practically completed following the bulk supply being inaugurated when a Holding Company stepped in with an offer considerably in excess of what the municipality considered the Undertaking to be worth. With all due deference to the Holding Company, I think the municipality's valuation was more nearly correct, and this is borne out by the fact that the price of gas in Broxburn was recently increased by 5d. per 1,000 cu.ft., making the price 5s. at a time when prices elsewhere were going down, without any alteration in price for gas supplied in bulk. A seller is, of course, entitled to take the best prices obtainable, but a buyer is not rendering a service to the Gas Industry when he pays a price so high that gas cannot be sold at a price to compete with other fuels. I am not criticising holding companies in general, nor any company in particular, I am suggesting only that holding companies may have a tendency to pay more than the economic value of an undertaking. If they can, in spite of that, extend the use of gas in the areas taken over, they deserve our warmest commendation.

Consequent upon the extension of the gas supply to Broxburn, it has been possible to provide gas in rural areas to the west of the City where gas service has not been available previously. We have acquired the Queensferry Gas Undertaking, and now supply gas in that Burgh at prices about 30% less than were charged by the old Company, and the intervening areas between Broxburn and Queensferry have been linked up.

Geographically, one would be inclined to expect linking-up operations to extend from Edinburgh to the east and south-east, because in these directions lie the larger and older centres of population. But just because these centres are older, they present the greatest difficulties. Gas undertakings are already in existence in these areas, and vested interests are stronger. It is of interest to note, however, that the greatest expansion of the City in recent times has been to the west, and the provision of gas supplies somewhat in advance of the movement may tend to assist and accelerate this shifting of population towards the west. Indeed, the anticipated continuation and ac-

celeration of this westward movement was one of the reasons for embarking upon these schemes of expansion.

Where linking up by mains is not profitable we might examine the question of a co-operative agreement for the supply of compressed gas in cylinders. In a small works the high cost of manufacture is invariably the factor which makes gas expensive. We have observed the rapid strides which are being made with the development of "Calor Gas" in rural areas, and from various accounts I have had from users it appears to offer great possibilities. But "Calor Gas" is not very cheap, and this I feel will limit its field of usefulness. There is, however, a pointer in it for the Gas Industry. Road transport is not now expensive, and high-pressure gasholders are coming into more general use. I see no reason therefore why a considerable advance should not be made by the larger undertakings in making available compressed gas at reasonably cheap prices to assist in keeping the inhabitants in our rural areas gas minded. Wallasey Corporation Gas Department sold 750,000 cu.ft. for rural supplies in 1936. It is a question worthy of careful consideration at the present time.

Co-operation Within the Industry.

So much then for co-operation by physical amalgamation. Where this is not possible, other forms of co-operation are not necessarily ruled out. There can be co-operative buying, selling, training, finance, and research. In Scotland, co-operation in those directions is in its infancy, if it can be said to exist at all. True, we have our National Gas Council looking after the wider national interests of the Industry, and our British Commercial Gas Association dealing very effectively with our national publicity. But obviously these organizations do not and cannot come to close enough grips with our everyday problems, though they may well form the nucleus from which such a workaday co-operative organization might spring.

Some of our organizations, I am afraid, are not so effective as they might be in solving our problems. The manner of meeting in public session and the considerable social element present in the proceedings make it inevitable that we strike an optimistic note, making public our successes, glossing over or ignoring our failures and difficulties. That is all very well in its way. So far as it creates optimism and enthusiasm on our part and interest on the part of our consumers it is good. If, on the other hand, it engenders complacency in ourselves it is bad. We can undoubtedly learn from the genuine successes of other undertakings, but I believe we can be of greater assistance to each other if we discuss our difficulties and concentrate upon pooling our resources and ideas in order to overcome them. Our difficulties are patent enough, and there is a tremendous amount of good work which could be done by a central co-ordinating committee.

Holding Companies or Central Co-Operation.

The only attempt at anything of the kind so far has been the buying up of undertakings by holding companies. Such an arrangement is satisfactory in so far that effective control of policy and supervision of management can be exercised from the centre, provided those at the centre have the interests of the Gas Industry at heart and the knowledge and ability to take proper advantage of centralized control. Where these qualifications are lacking and central control of finance only is the primary consideration, the holding company is a menace to the Industry. While it is no doubt a compliment to the Gas Industry and a sign of confidence in its future that holding companies, and through them the public, are prepared to sink capital in the purchase of gas undertakings, I feel that the interests of the Industry would be better served by some form of central co-operation and control initiated from within the Industry itself. Adequate and business-like control from the centre is notoriously difficult to achieve unless the central body has the power of authority behind it. The question is whether the owners of our Industry would voluntarily grant such authority, or would the central body require to purchase a controlling interest, and in the latter case would they require special legislation? Marketing schemes are not greatly in favour these days, but it must be remembered that they represent the new economy in its experimental stages, and I believe it is some such scheme, voluntarily agreed upon by the proprietors of the gas undertakings in their own interests and possibly given legislative sanction which would achieve the measure of co-operation so necessary in our Industry to-day. It may be that it will require a greater degree of adversity than the Industry has yet experienced to induce voluntary agreement to such a scheme, but the small undertakings would do well to remember that by that time the larger undertakings will perhaps be too busy fighting their own fight to devote time and possibly money to rescuing their weaker brethren.

A short preliminary review of load variations, with the aid of the accompanying charts, may, however, prove helpful in showing the lines along which our business can best be developed.

Output—Weekly, Monthly, and Yearly—Peak Load.

I have reproduced some of the charts embodied in the Presidential Address delivered by my predecessor, Mr. Gracie, to this Association in 1928 and have added to these the figures for last year. Although only nine years have elapsed, the tendencies then exhibited have been accentuated.

Chart No. 1 shows that the output of gas in cubic feet has steadily increased year by year, this increase being no less than 57·5% since 1923, or at the average rate of 4·4% per annum, showing a record hard to equal for a city the size of Edinburgh, the population having increased only by 9·6% in the same period. Better housing conditions have helped these figures by increasing the number of consumers by 19·3%, but the greatest influence has undoubtedly been the gradually decreasing price of our product, coupled with the forward policy adopted for sales in the domestic and industrial fields.

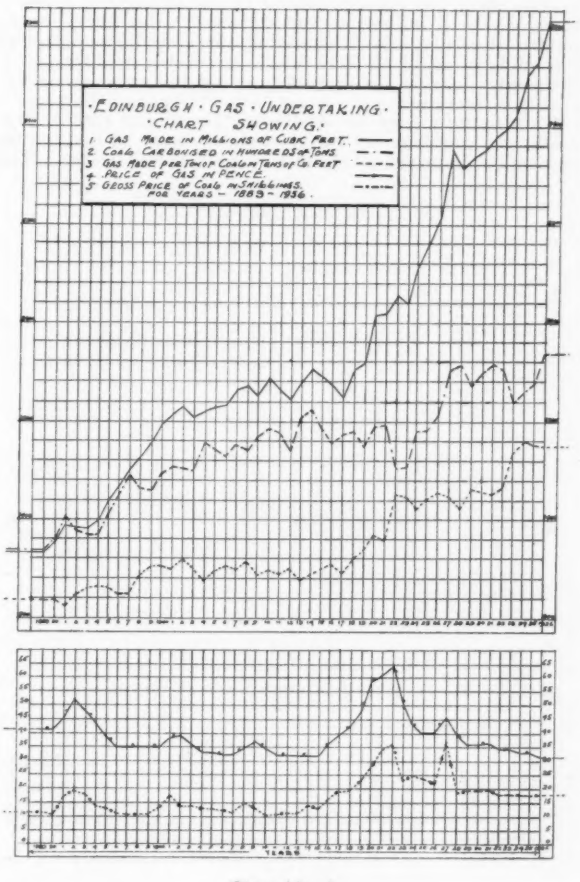

·EDINBURGH · GAS · UNDERTAKING·
·CHART SHOWING·
1. GAS MADE IN MILLIONS OF CUBIC FEET.
2. COALS CARBONISED IN HUNDREDS OF TONS
3. GAS MADE PER TON OF COALS IN THOUSANDS OF CU. FEET
4. PRICE OF GAS IN PENCE.
5. GROSS PROFIT OF COALS IN SHILLINGS.
FOR YEARS – 1883 – 1936.

Chart No. 1.

Scales of charges have been modified and simplified, and to-day we are charging in accordance with the following scale for all purposes:

(1) Ordinary Meters.

Consumption Over a Period of Approximately Three Months Through One Meter.	First 5,000 Cu.Ft.		Remainder at *One* of the Following Prices.	
	Per 1,000 Cu.Ft.	Per Therm.	Per 1,000 Cu.Ft.	Per Therm.
	s. d.	d.	s. d.	d.
Consumption up to 5,000 cu.ft. . . .	2 9	6·947	...	..
Over 5,000 up to 100,000 cu.ft. .	2 9	6·947	2 3½	5·789
,, 100,000 ,, 250,000 ,, .	2 9	6·947	2 1½	5·368
,, 250,000 ,, 500,000 ,, .	2 9	6·947	1 11½	4·947
,, 500,000 ,, 750,000 ,, .	2 9	6·947	1 10	4·632
,, 750,000 ,, 1,000,000 ,, .	2 9	6·947	1 9	4·421
,, 1,000,000 cu.ft.	2 9	6·947	1 6	3·789

(2) Prepayment Meters.

The charges are the same as for ordinary meters, except that the first 5,000 cu.ft. for each period of approximately three months is charged at the rate of 2s. 10·5d. per 1,000 cu.ft. (7·263d. per therm).

This scale was intended to be a first step only towards reduced prices for " extra " gas, and had it not been for the increase in the price of coal would already have been modified considerably in the second and succeeding stages.

Two points should be observed particularly—one is that the prepayment consumer can only pay 2s. 6d. per annum more than the ordinary consumer, no matter what the consumption may be, and this we consider reasonable, as appliances are available on free loan, hire, or hire-purchase to both classes. The second point is that industrial and commercial consumers using as little as one million cu.ft., or 4,750 therms, per quarter can obtain gas at less than 4d. per therm. This scale has enabled us to cater for the smaller and more varied industrial units peculiar to Edinburgh, where there are few of the heavy type.

Monthly Output of Gas.

Chart No. 2 shows the monthly output of gas for 1935 compared with 1926 and 1889, and demonstrates how we are smoothing out the curve of output. This is also clearly indicated in Chart No. 3, showing the weekly outputs for the same three years. Even in the space of nine years a visible effect has been produced in the summer " valley " to which both industrial and domestic sales have contributed. Further, notwithstanding the cumulative effect of loss of lighting in all new houses presently being erected, the winter load is also improving, and the average weekly output is exceeded on no fewer than 27 weeks of the year.

I am by no means satisfied with the present rate of progress, and am convinced that our main hope of making an immediate impression on it is by selling hot water. The

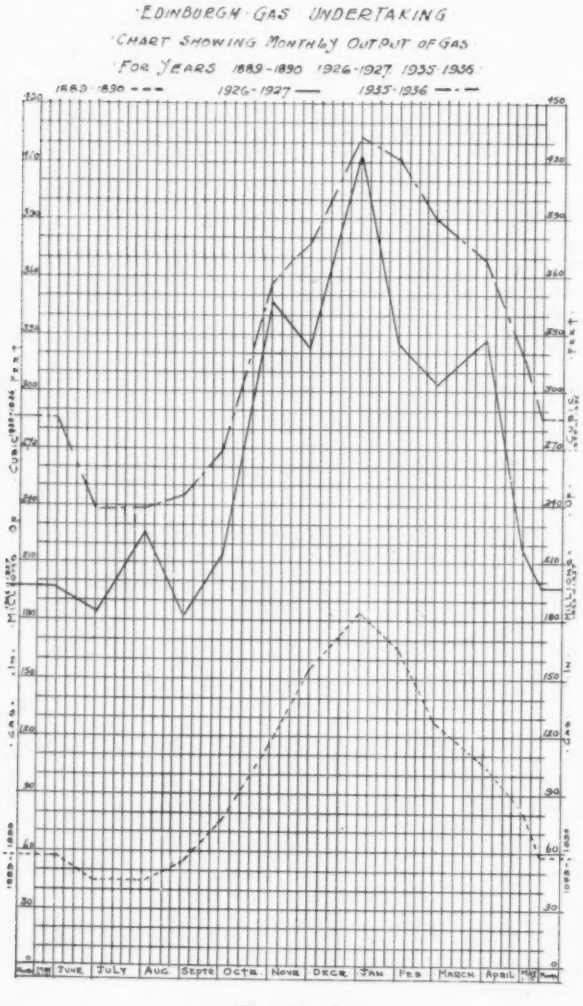

EDINBURGH GAS UNDERTAKING
CHART SHOWING MONTHLY OUTPUT OF GAS
FOR YEARS 1889-1890 1926-1927 1935-1936
1889-1890 1926-1927 1935-1936
JUNE JULY AUG SEPTR OCTR NOVR DECR JAN FEB MARCH APRIL

Chart No. 2.

exploitation of this load by the Gas Industry would revolutionize our ideas of output, and by filling up the summer valley give a load factor such as to enable considerable reductions in prices all round. I estimate that it only requires one-third of our consumers to burn an extra 1,000 cu.ft. per week in the summer months in order to produce such a factor, and I am confident that such a conversion can be made if tackled in earnest and with the help of scales of charges so framed that every consumer can obtain this extra amount at prices in the region of 3d. to 4d. per therm.

Hourly Output of Gas.

Chart No. 4 shows the total output for each hour of the day for the years 1910, 1926, and 1935. While in 1926 we

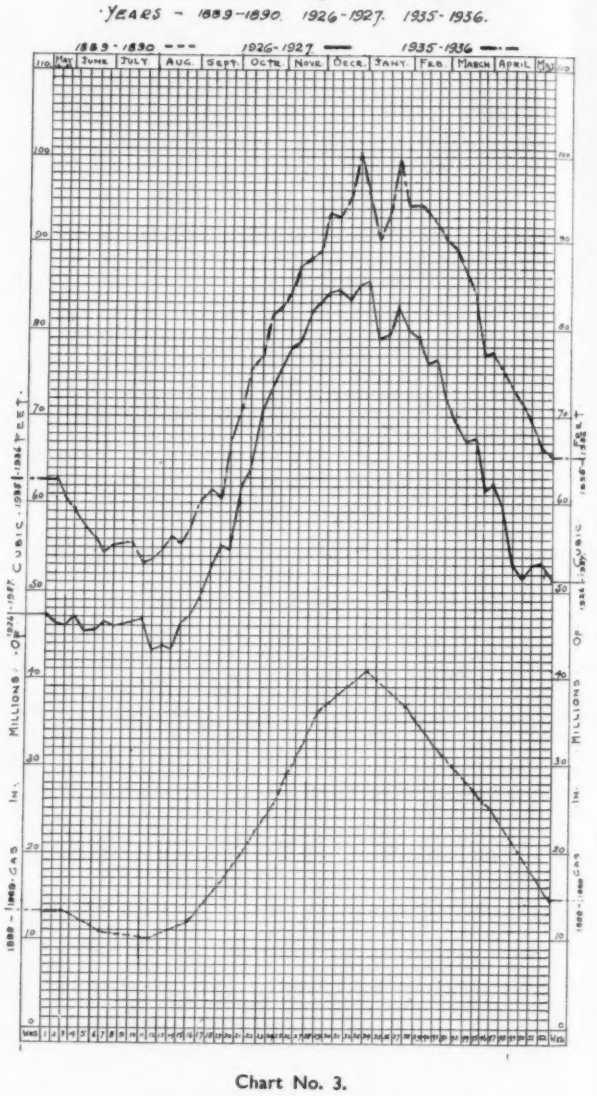

EDINBURGH GAS UNDERTAKING
CHART SHOWING WEEKLY OUTPUT OF GAS FOR
YEARS - 1889-1890. 1926-1927. 1935-1936.
1889-1890 1926-1927 1935-1936
JUNE JULY AUG SEPT. OCTR. NOVR. DECR. JANY. FEB. MARCH APRIL

Chart No. 3.

were congratulating ourselves on having equalized the day and evening output, thus making fuller use of the distribution system, it will be observed that the delivery for the noon load has increased since then by no less than 50%. This is emphasized to a greater degree in the outputs for typical summer and winter days shown on charts Nos. 5 and 6, where in summer the noon hour greatly outstrips any other during the day, and in winter the three peaks representing breakfast, dinner, and tea are almost equal.

The reason for this is bound up in the extensive housing and rehousing schemes completed in recent years and presently being developed and, by all appearances, likely to be accelerated soon, and in our success in capturing the cooking load for these dwellings, the range and open fireplace being no longer used for cooking purposes. These peaks emphasize the necessity for providing trunk and district mains of ample capacity to give the consumer an even pressure at the point of consumption and ample reserves for these and other loads as they arise.

Cooking and Space Heating Loads.

It will be agreed, I think, from an examination of these graphs that our market as it exists to-day depends chiefly upon the cooking load. In that, I include catering and

baking, but domestic cooking is undoubtedly our base load. To the Gas Industry the maintenance of cooking as an unassailable base load is vital, because without it the difficulties of framing promotional rates to encourage other uses of gas are well-nigh insuperable. Methods of maintaining and encouraging the cooking load are numerous and well known, attractive hire or hire-purchase rates for cookers, cookery demonstrations, home service, but how many of us in Scotland are using these methods to the full? I make bold to say not one. I agree there are difficulties, financial and otherwise, but it is just by co-operation and the pooling of resources and ideas that these difficulties can be overcome. For example, the majority of small and medium-sized undertakings cannot afford to employ a full-time cookery demonstrator. Would it not be possible for the Industry, in conjunction with the domestic science schools and appliance manufacturers, to maintain a national training centre in Scotland which would have cookery demonstrators available to send out periodically to the smaller undertakings to assist in cooker sales campaigns by demonstrations both to the public and in the houses of consumers who have difficulty with their appliances? In short, a national home service organization financed by the undertakings according to the use they make of it. This is a scheme which requires no grandiose plans involving legislation, but only a willingness on the part of undertakings to make reasonable use of the service for their own benefit.

As an indication of what can be done by the adequate resources of co-operation as against the stunted efforts of a small undertaking operating under financial difficulties, our experience in the sale of appliances in Queensferry may be of interest. We took over on Aug. 1, 1936, and up

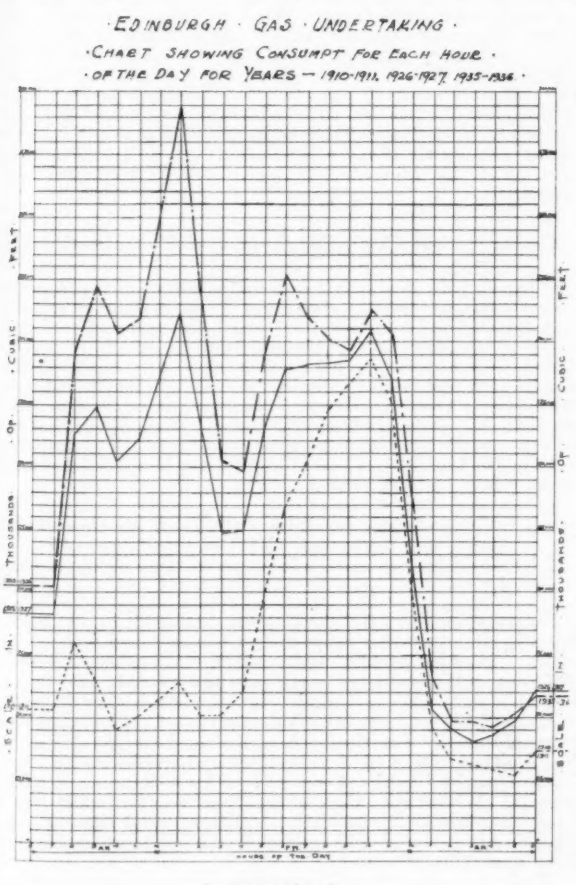


Chart No. 4.

to the time of going to press in an area with less than 600 consumers transactions in appliances have been as follows:

—	New.	Exchanges.	Total
Cooking appliances	105	40	146
Fires	36	..	36
Other	14	..	14
	156	40	196

Space heating, though it levels the hourly curve of output, follows cooking as rather a poor second best contributor to our load. The means of encouraging demand in this direction are perhaps not so obvious and direct. We can advertise, exhibit, and demonstrate apparatus in our showrooms, participate in exhibitions, and make promotional tariffs. But above all we must sell to the customer on the district. Business will not come fast enough of its own accord. Here again our training centre might be of use to the smaller undertakings in training salesmen and

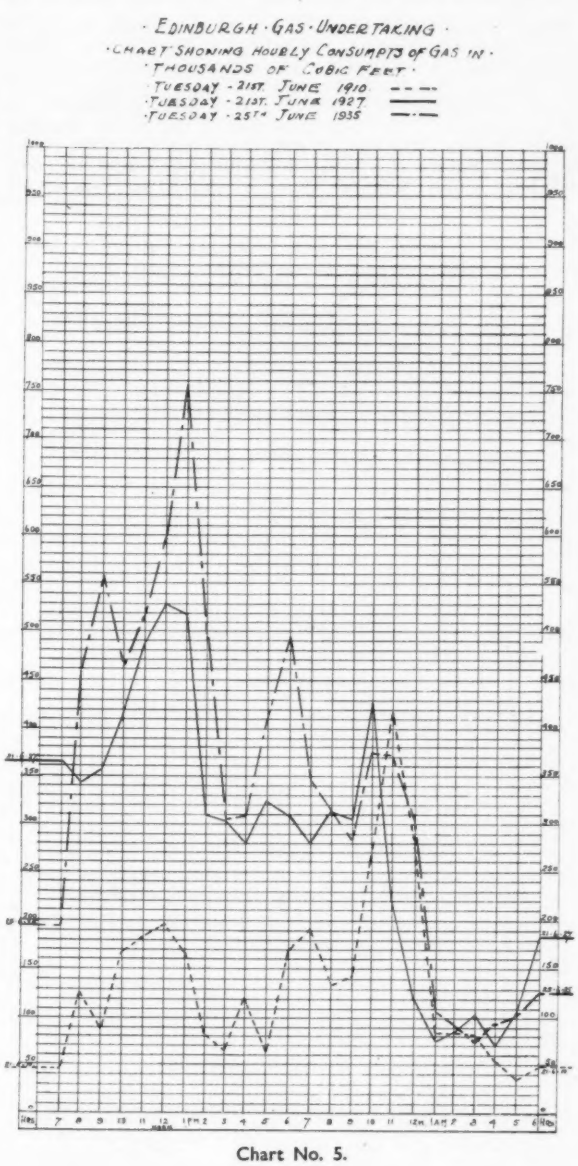


Chart No. 5.

having them available to send to the rural areas for periodical sales campaigns for gas fires and other appliances.

In Scotland we still retain a substantial domestic lighting load. A recent census in Edinburgh showed that about 60% of our consumers still use gas for lighting. To be quite frank, however, we rarely now install gas lighting in new properties. That is no reason, however, why we should not make every endeavour to retain the lighting load where it at present exists. It is without doubt a most useful load, now that our peaks are tending to coincide with the cooking hours, and is still one of considerable magnitude. The Edinburgh records show that tenants transferred from slum properties where gas was used for lighting and cooking, to Corporation housing estates where gas is used for cooking only, use about 30% less gas in their new homes. The part that co-operation can play in helping us to retain the lighting load is not quite so clear as in the case of our other loads, but a co-operative effort to develop lighting equipment which would be cheap, easy to fit and maintain, and foolproof would in my opinion be of great assistance.

I have said that cooking is our base load, but the Industry cannot exist on the cooking load alone. Other loads will come only if we look for them, and looking for them is a scientific business, particularly when we come to

industrial loads. In this latter direction, we in Scotland have been content to wait until we were asked, and no business can operate on these lines indefinitely and hope to survive. Surely Scotland has a large enough industrial area to maintain at least one industrial research centre for the benefit of all.

Water Heating.

There is one load, however, which, as already stated, I believe has tremendous possibilities. That is the water heating load. Undoubtedly gas water heating equipment has reached a pitch of efficiency which brings water heating by gas within the reach of a very large proportion of our consumers. The potentialities of the water heating load have been estimated at something like twice the cooking load. Surely this is a load which we ought to seize with both hands; and yet there is very little evidence of

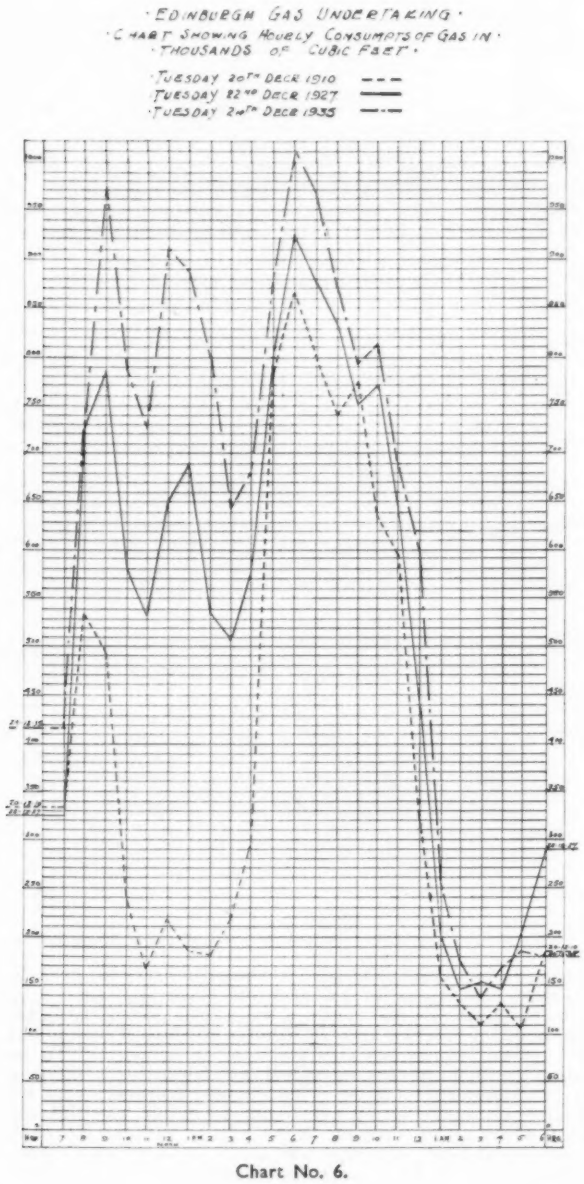

EDINBURGH GAS UNDERTAKING
CHART SHOWING HOURLY CONSUMPTS OF GAS IN
THOUSANDS OF CUBIC FEET
TUESDAY 20TH DECR 1910
TUESDAY 22ND DECR 1927
TUESDAY 24TH DECR 1935

Chart No. 6.

any intensive effort in Scotland to do so. I believe that to capture this load we must first of all get at the men who can influence the design of standard water heating equipment in new properties, namely, architects, builders, and plumbers. To do so adequately we must intensify our local efforts and have them backed up by the authoritative publicity and influence of a central body, to which we can also submit our difficulties and obtain a solution from the common pool of experience. We must, above all, help the smaller undertakings to capture this business and so strengthen their competitive position. I should even go so far as to suggest that we should finance this water heating load in the early stages, because I am sure we can look upon any such expenditure as an investment which will ultimately yield a handsome return. We financed the cooking load with free or cheap gas cookers. Can we not do the same for water heating in the confident anticipation of an equally satisfactory result?

Service to the Consumer.

Whatever loads we capture, we cannot hold without good service. Service counts for a great deal in a continuous supply such as ours, where our customers are always with us. Given a reasonably competitive price, service counts for more than cost with a very large proportion of our consumers, and that the most remunerative section. By service, we mean sound advice as to the best and most suitable equipment to install, neat and effective installation work, and quick and efficient attention to complaints. In short, the appliance must look well and do its job with the minimum of interruption and trouble to the consumer.

To accomplish this we must have men with enthusiasm and proper training. We have little control over enthusiasm, but we can at least insist that new men entering the Industry are adequately trained and equipped for their work.

In this respect we in Scotland are still lagging. The provision of adequate training facilities is not always an easy matter for the individual undertaking, but here again co-operation could, I am sure, supply the deficiency. Can we not have a research and training house for Scotland?

I would strongly advocate a greater measure of co-operation between the Scottish undertakings, primarily for the benefit of the smaller undertakings, but ultimately no less for the benefit of the large. What we require is something in the nature of regional selling and training facilities on the distribution side, and following on that a far bigger selling push than has ever been seen in Scotland before. The Industry is to all appearances entering upon a phase of prosperity. Can we not during the few years of boom conditions ahead set our house in order so that we may be strong enough to weather successfully the years of depression which in a greater or lesser degree will assuredly follow?

Co-operative Coal Purchase and Examination

It is not only in the sale and distribution of gas that co-operation is necessary. Take our basic raw material, for instance: is the important part which the price of coal and its selection plays in our manufacturing costs fully appreciated? Co-operative purchasing may not sound attractive, it may not be feasible, but it is surely worthy of consideration. There is also the question of suitability, size, grading, blending, and selection of coal, all of which contribute to the economic production of gas. The late Sir Arthur Duckham, in his William Young Memorial Lecture at Aberdeen in 1930, stated:

> "With slightly swelling coals such as those from Scotland and Derbyshire the best results are obtained by working with quite a large proportion of fines in the coal."

I was associated with the late Sir Arthur in an extensive investigation into this subject, and I unreservedly share his views. Doubles, trebles, and a mixture of broken coal from different collieries were analyzed and tested, and much valuable data was collected. In all tests higher calorific value and higher gaseous yield per ton of coal carbonized were obtained from the broken coal and smalls. It must be admitted, however, that doubles and trebles are in Scotland recognized as the standard fuel for continuous vertical retorts. With these sizes of smalls the carbonizing plant runs smoothly and with little attention, but I suggest production efficiency should be equally if not more important than operating efficiency.

While it is true that therms per ton may not have been the most important factor in production costs in the past with the rise in price of coal, shortage of sized fuels, and the uncertain residual product market the influence of therms per ton will assume a much greater importance in the immediate future.

During the past two winters we have experienced an acute shortage of coal. The demand for sized fuels is increasing and collieries are actually breaking coal to meet requirements. It is unlikely therefore that doubles and trebles will be obtainable at prices much, if at all, below screened coal. It looks as if we are unlikely to have any bargain lots offered to us in the immediate future. So long as the residual product market remains favourable the the effect of rising prices and altered conditions may not be fully felt, but it would be unwise to ignore the changed circumstances as sooner or later they must be faced.

Comparison of Thermal Yields.

During the last year in which 500 B.Th.U. gas was supplied in Edinburgh, 74·46 therms per ton of coal carbonized were produced, and for the first year in which 475 B.Th.U. gas was made the yield was 82·26 therms, an increase of 10·5%. That is what one expects from a reduction in the calorific value of gas, indeed it was with the object of economizing in coal that the change was made. This reasoning carried to its logical conclusion would suggest that the highest gaseous yields should be found among the undertakings supplying the lowest quality of gas. That, however, is not so, as the undernoted statement compiled from the Board of Trade statistics for Scotland reveals:

Quality of Gas.	Therms per Ton.	Coke and Breeze Made per Ton.	Tar per Ton.
		Cwt.	Galls.
500	70·3	13·9	16·6
475	81·5	12·8	16·0
450	81·1	12·0	19·4
425	79·8	12·1	18·3
400	73·3	12·1	17·5
375	75·0	9·8	21·1

In a Paper which I presented to this Association in 1932, entitled "Calorific Values and Their Relation to Working Results and Costs," I gave the results obtained from a mixture of broken coal when producing different qualities of gas, and in order again to focus attention I have reproduced in Chart No. 7 the thermal yields along with the above figures. The tremendous gap in the two curves requires some explanation, and illustrates its importance. I do not propose to offer a reason for the great discrepancy shown not only in the thermal yield of gas, but in the amount of coke and tar produced. Indeed, with the information available I do not feel I am competent to do so, but I suggest it indicates that the selection of coal and carbonization procedure are worthy of our closest attention at the present time.

A renewed investigation on co-operative lines into the merits of different sizes, grades, and qualities, and mixtures thereof, of various coals would be most helpful. It would also be an interesting study to many of us to apply a weight balance at frequent intervals as a check on the working of the carbonizing plant and with the object of minimizing leakage and exposing inefficient results.

I have often regretted the diffidence to experiment along these lines shown by many of my colleagues with whom I have discussed this matter. The tendency seems to be to leave well alone, and the acid test appears to be based on a comparison with former years' results. If that has been originally fixed on a faulty standard, it is unlikely that an improvement will be found with this procedure. This is not only unfortunate, it is a regrettable attitude to take up when such valuable contributions could be made towards the common pool of experience. We should not cloud our minds to the fact that none of us are doing as well in carbonizing results as we might. We have still much to learn. In Edinburgh we are doing probably as well as most, but I am far from satisfied with the position. We are handicapped with our coals, we have no first-class gas-making qualities apart from Cannel in the Lothians, nor have we any coking coals, which have to be imported from Lanarkshire or Ayrshire, with heavy railway charges. In that respect we are at a disadvantage. No one can suggest, however, we are not trying, indeed we are constantly striving to improve our results, and our fortunate position to-day is largely due to our efforts in this direction. During the past ten years coal examination and testing have cost the Department at least £20,000. But how much easier and how much more rapid progress would be if we were all contributing a share to this work. The smallest undertaking can play its part, and in that way make its position stronger and in addition make a valuable contribution to the information available on the carbonization of coal. On this particular subject co-operation is not only necessary; it is essential, and never more so than it is to-day.

Disposal of By-Products.

There is also the question of the disposal of by-products. The sale of coke in Scotland is not only haphazard, it is chaotic.

We employ the same cut-throat principles as have brought other industries to the verge of ruin and forced upon them marketing schemes when it was almost too late. The London and Counties coke agreement appears to work smoothly and effectively; can the same not be done for Scotland before any slump in the coke market takes place?

The same unfortunate state of things can be found in the marketing of tar. Seven years ago a co-operative scheme similar to many of those which are operating so satisfactorily in the South was formed. It was sponsored by the Management Committee of the National Gas Council, and hope was expressed that unity would be possible. That hope was badly founded, and four of the six largest undertakings, responsible among them for 53% of the total tar produced by gas undertakings in Scotland, are operating outwith the scheme. However excellently conceived, could the movement be expected to succeed under such circumstances to the extent it might? We had everything to gain in this matter through complete unity, but again that has been found to be too much to expect. If our national organization was functioning efficiently, surely a remedy could be found to make co-operation in a question of this kind possible. It could not happen if our Industry were under holding company management or operating under commissioners. It is unfortunate it can happen under Municipal Administration.

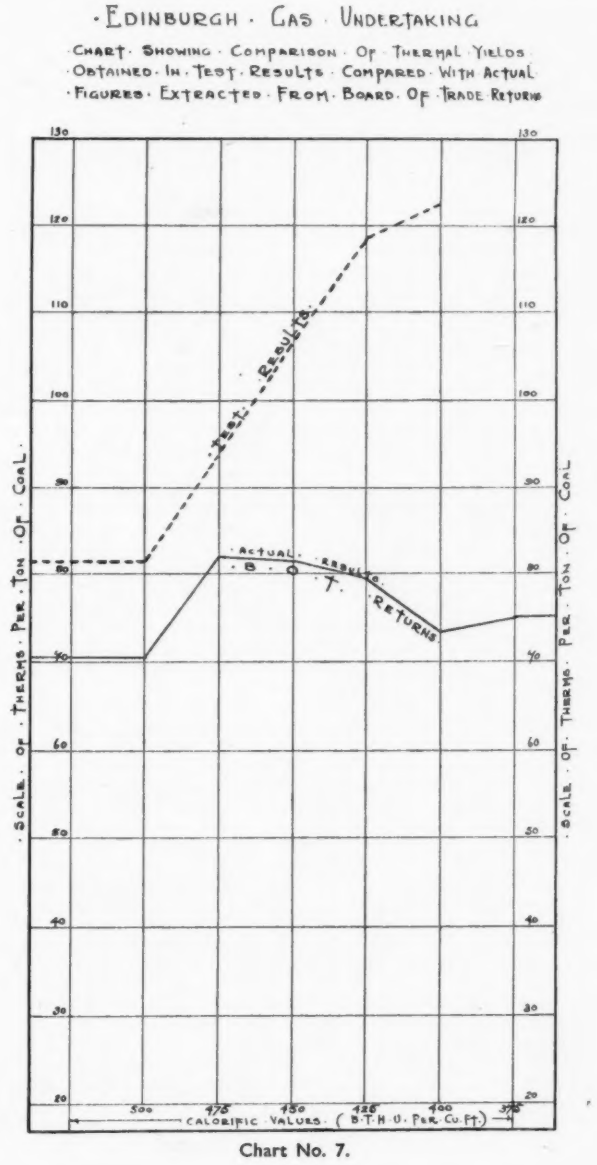


Chart No. 7.

Again, I agree there are difficulties, but difficulties were made to be overcome, and can be overcome with goodwill and a desire to work for our common good. I hope when our new Scottish Organization becomes operative that these suggestions will receive consideration, and that when the day comes for action support and assistance from all sides will not be lacking.

Research.

The change in focus of the work to be undertaken by the Research Committee of The Institution of Gas Engineers, whereby the main work is to be directed to the investigation of alternative methods of gas production and utiliza-

tion, marks a definite turning point in the history of our Industry. It is a diversion of the concentration of effort in the improvement of existing methods to the examination of the newer technique in hydrogenation, synthesis, and catalytic treatment of coal and its products. While this is all to the good, I hope it is not indicative of a slackening in effort on the problems which confront us at the present time. I particularly refer to the sulphur content of town gas. So far an economic solution of this appears to have baffled us, but has it been attacked in the concentrated fashion its importance demands? We have been told that by modification of existing processes the sulphur content can be reduced to 8 to 10 grains per 100 cu.ft. of gas. In Scotland, with our low sulphur content coal, I doubt if many undertakings are supplying gas exceeding these amounts, but no one would suggest we are satisfied with matters as they stand. Dr. Hartley, at the Autumn Research Meeting of The Institution of Gas Engineers, focussed attention to this question in no uncertain manner when he stated:

> "If you heat a room by means of a gas fire—a flued appliance—you render available to the consumer some 50% of the energy available in the gas. If, on the other hand, you can burn gas fluelessly for the heating of a room, you render available to the consumer 90% of the energy of the gas. This is equivalent to reducing the price of gas from 9d. to 5d. per therm, and you can do this without troublesome interference from the outside."

It is little wonder therefore that the slogan "Sulphur must go!" should be taken up anew. According to the late Professor Haldane, if it were possible to remove the whole of the sulphur from town gas there would be no objection whatever to using gas perfectly freely for any purpose and allowing the products of combustion to escape into the room. Research in the past has been responsible for harnessing practically all the products from the carbonization of coal and made their recovery economically possible. Are we to be baffled with the sprat that remains? The problem appears to be difficult, and on that account the greatest degree of attack is necessary. It has been stated that as an Industry we do not spend enough money on research, and I subscribe entirely to that view. I am unaware, however, of any appeal being made in recent years for an increased subscription from undertakings for this purpose. If sulphur in gas must go, the Gas Industry must pay for it, and I am convinced the money will not be lacking when the appeal is made. When Edinburgh Corporation can afford to spend £60,000 on a monumental chimney to distribute to the atmosphere the five to six tons of sulphur produced per day at their power station it would surely be possible for them to make a substantial monetary contribution to the complete recovery of sulphur from town gas!

I suggest, therefore, that the time has arisen for a concentrated attack on this bugbear which is hindering the development of gaseous fuel and at the same time endangering its reputation. A practical solution is surely not beyond our scientists. But again direction must come from within our own Industry, and it is in this way progress can be made.

With our Research Organization thoroughly manned and equipped, with sufficient funds at their disposal and the complete co-operation of the Gas Industry behind it, I feel certain that not only sulphur will go but, in addition, many other pressing problems will be solved and progress will be accelerated to a pace commensurate with the importance of our Industry. One has only to follow the march of events which are taking place not only in this country but abroad to be fully alive to the necessity of a super efficient research organization within our Industry. Changes in methods of treating coal and products are taking place daily, changes which the Gas Industry cannot afford to ignore, if it is to take its proper place in the fuel industry of this country.

Carbonization of Cannel.

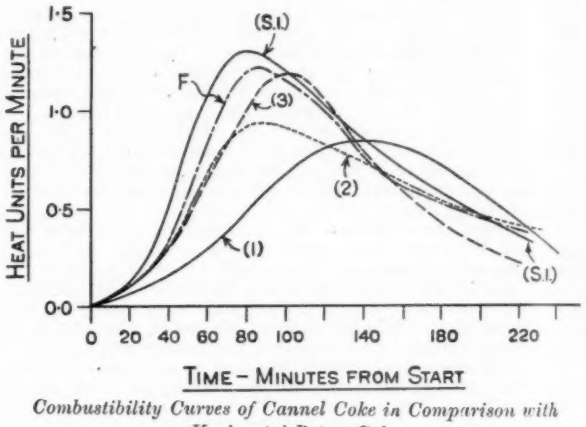
A good deal of publicity has been given to the work carried out at Granton on the carbonization of cannel, the results of which were given in a joint Paper presented by Dr. King and myself at the Meeting of The Institution of Gas Engineers held in May of last year.

The quantity of cannel treated over a period of 14 months amounted to 22,000 tons. Altogether 12 tests with weight balances for each were completed, the results of 8 tests being published in the Technical Press at the time. It is therefore unnecessary to go again in detail into the results but the comparison in the next table must surely interest those responsible for the production of town gas.

Notwithstanding these attractive results, doubt has been expressed in some quarters as to the commercial value of the investigation to the Gas Industry. This may not be surprising, since little cannel has been used this century for the manufacture of gas, and to the present generation of carbonizers it is little if at all known. Too much stress has therefore been put on a reputation handed down from the past. We have been told that supplies are not only limited but irregular in formation. That is true, but it is equally true for many other grades of coal. In Scotland we have no abundance of highly caking coals, but our gas does not cost more to produce on that account. Again, many of the splint and bituminous coals mined in Scotland have ash contents greater than cannel and give a coke of no better quality. Take the solid residue from Newbattle cannel, for instance, it is in no way inferior to that produced from the best Lothian splint coal, and it is as good as many of the smokeless fuels produced from coking coal, as the undernoted diagram shows.

Comparative Results from Cannel and Edinburgh Results. 1936.

—	Cannel.	Edinburgh Results.1936.
Gas made per ton	26,500 cu.ft.	17,096 cu.ft.
Quality of gas	480 B.Th.U.	475 B.Th.U.
Therms made per ton	127·2	81·2
,, ,, ,, retort	1,069	610
Coke produced	9·5 cwt.	12·81 cwt.
Tar produced	50 galls.	16 galls.
Motor spirit produced	4½ ,,	2·5 ,,
Cost per therm	1·26d.	1·33d.
,, ,, (tar at 4d.)	0·51d	..
Price of raw material	21s. 6d.	17s.



Combustibility Curves of Cannel Coke in Comparison with Horizontal Retort Coke.

1. Horizontal retort coke from Yorkshire coal.
2. Vertical retort coke from Yorkshire coal.
3. Vertical retort coke, Scottish gas coal.

F. Cannel coke from test F.

S.1 Standard low-temperature coke, Fuel Research Station.

Availability and Utilization of Cannel.

It is true to say that at the moment supplies are definitely limited, and until recently no attempt had been made to assess the reserves available. With the publication of the second report of the Oil from Coal Committee of the Scottish National Development Council some light is thrown on the subject. It is estimated that in Scotland there are reserves containing less than 8% ash amounting to 25½ million tons, of which 20½ million tons are in the Lothians. The potential daily output is given at 1,438 tons, representing at least half a million tons per annum. Assuming this to be of a quality comparable with the Newbattle tested it would produce 70 million therms or 65% of the gas supplied by Statutory Undertakings in Scotland. On this basis the reserves would last for at least 50 years.

In Edinburgh last year 230,000 tons of coal were used to produce 3,934 million cu.ft., or 18,690,138 therms, of gas. If cannel of a similar quality to Newbattle had been used the demand would have been satisfied with 155,750 tons or 32·3% less, with a corresponding increase in plant capacity and other compensating advantages. If we take Greenock, the fifth largest undertaking in Scotland, where 410 B.Th.U. gas is supplied, we get a much better comparison. The coal carbonized for year ended May 15, 1936, was 39,529 tons. The cannel equivalent would have been less than 20,000 tons. The significance of these comparisons cannot fail to be appreciated in these days of rising coal prices. Railway carriage in the case of Greenock could be reduced by 50% and in Edinburgh by 32·3%, and undertakings more remote from the coal fields would benefit substantially. The capacity of carbonizing and coal handling plant is increased proportionately to the quantity of cannel

used while carbonizing costs fall in the same ratio. Undertakings faced with extensions to carbonizing plant would do well to consider this point before embarking on additional capital expenditure to meet a peak load. For an emergency a stock of good cannel is invaluable to any gas undertaking, and I commend it for this purpose if for no other.

Cannel, unlike ordinary bituminous coal, does not deteriorate when exposed to weathering, nor so far as we have been able to ascertain is it subject to spontaneous combustion. On that account it is an excellent material for storing purposes. We have all had experience of the difficulties associated with the carbonization of stock coal. These difficulties may not be so acute where highly caking coal is used which does not deteriorate to the same extent as the non-caking coals commonly used in Scotland. After six months' exposure to the atmosphere supplies are affected to an extent hardly believable, and this makes the laying down of stocks at all a very doubtful proposition. It is here that cannel can be helpful. It is a hard coal barely affected with rough handling, easily stored, and, as already stated, it does not deteriorate on storage. Less cannel requires to be stocked to give the same degree of safety. In Greenock only one half, and Edinburgh two-thirds, would be required with a consequent saving in interest charges. When used it would give its maximum value in gas, coke, and tar, so that unlike ordinary coal it is not a depreciating investment.

Cannel makes an excellent fuel for carbonizing in continuous vertical retorts. It is easy to carbonize, requiring little or no rodding, and 15 tons can be treated in a retort of a nominal capacity of 12 tons per day. It is difficult to break, but in the case of Newbattle this is done at the pit. It produces a much greater quantity of gas, a smaller amount of coke, and a very high yield of crude oil. Cannel can be used mixed with ordinary coal, but if full advantage is to be taken of its commercial value it is necessary to carbonize it separately so that the crude oil can be collected.

It has been shown that from one ton of Newbattle cannel 50 gallons of crude oil are available, which, on hydrogenation, will give an equal amount of motor spirit and 28 lb. of wax, or, alternatively, 23 gallons of motor spirit, 33½ gallons of Diesel engine oil, and 28 lb. of wax. This has an important bearing on the value of cannel to the Gas Industry. At ordinary prices the value of the crude oil is more than the value of the coke when the price of coke is taken at 20s. per ton. If the crude oil is assessed at 4d. per gallon gas can be produced in Edinburgh at less than a halfpenny per therm, which demonstrates the great potentialities which cannel offers to gas undertakings willing to process it.

Benzole Recovery.

In 1934, when faced with an imminent increase in the price of coal and when the future for coke appeared bright and the price of home produced motor spirit likely to be stable for some years, the question of benzole recovery appeared worthy of investigation, even if it were only to contribute to the home production, if this could be done without loss and with possible contribution to the anticipated increase in the price of coal.

As at the majority of gas undertakings, benzole was recovered during the war years in Edinburgh, but on the cessation of hostilities, on account of the uneconomic prices then being paid, the plant, which was more or less of a makeshift, was scrapped. Since then vertical retorts have superseded the inclined retorts, and as the quality of the benzole from vertical retorts using Scottish coals is admittedly not of such good quality as that produced from English coals or in gas produced from horizontal retorts, a small scale scrubber and stripping plant was installed at Granton, which while only scrubbing 500 cu.ft. per hour produced sufficient benzole to enable quantitative tests on quality and possible yield. The amount of recoverable benzole was found to be between 3 and 3½ gallons per ton of coal carbonized, and the abstraction of this amount reduced the calorific value of the gas by 33·4 B.Th.U. per cu.ft. The benzole, although low in gravity, was acceptable to the National Benzole Company, and was assessed by them to be worth about 11d. per gallon under the present method of evaluation. After consideration of the various factors, it was decided to install a recovery plant, but in view of our declared calorific value of 475 B.Th.U. per cu.ft. it was impossible to recover the total amount available. It was eventually decided to install a plant large enough to abstract one gallon per ton of coal carbonized when producing 15 million cu.ft. per day, thus allowing for the production of 2 gallons per ton when the demands on the carbonizing plant is less.

The actual carbonizing statistics and profit for the first complete six months' operations are of interest, and I have given in appendix No. 1 a summary of these compared with the makers of the plant and our forecasts.

The various figures do not call for much comment. The reduced make per ton over the six months of 16,033 cu.ft., being a reduction of 1,235 cu.ft., is probably not entirely due to benzole recovery, as a large proportion of the carbonizing plant in operation during the period was due for extensive repair, and the reduction will probably be much nearer the makers' estimate when the plant is re-constructed. On the actual figures for the six months, it is confidently expected that the profit on the first twelve months' operation will be sufficient to pay for the installation of the plant. The gross profit represents 7d. per ton of coal carbonized.

Electro-Detarrer Installation.

The Whessoe Woodall-Duckham electro-detarring plants comprise three gas treating plants supplied with high-tension current generated by two English electric motor-generator sets. Two of the treating vessels are installed at the inlet to the scrubbing plant in No. 1 section, and have a daily capacity of 5 million cu.ft. each, while the third vessel is placed at the exit from No. 2 section scrubbing and washing plant, and the connections are so arranged that coal gas or coal gas mixed with carburetted water gas can be treated up to a daily capacity of 13 million cu.ft.

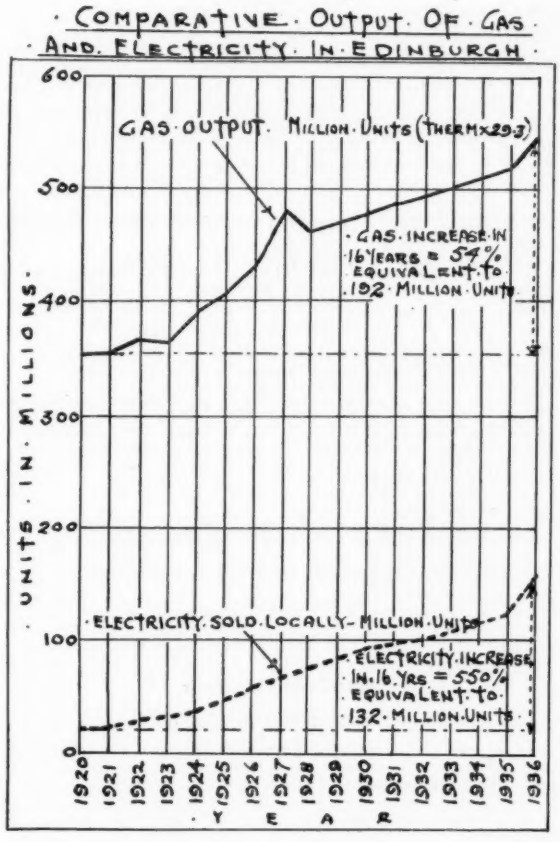


Chart No. 8.

The detarrers were installed in order to reduce back pressure throughout the scrubbing and purification plant and to improve the quality of the spent oxide and prolong its life. Back pressure has been reduced by at least 6 in. at full load, and the tar content of the spent oxide recently sold is 30% less, although the full benefit in the purifiers will not be felt until the oxide in use prior to the installation of the detarrers is completely worked up.

Castell interlocking systems are incorporated in each set, so that access to a given treater may only be effected after the appropriate isolating switch is locked in the earthed position. Only then may the corresponding Castell key be released and used for unlocking the manholes and handholes on the treater for inspection purposes.

The detarrers have comfortably exceeded their guaranteed tar-fog extraction efficiencies, and the undernoted

table illustrates the high standards reached and easily maintained:

Treater.	Tar Fog in Grains per 100 Cu.Ft.		Efficiency %	Current Passing (Milliamps.).
	Inlet.	Outlet.		
No. 1 . . .	158·4	0·8	99·5	57
No. 2 . . .	136·8	1·8	98·7	60

These treaters replaced two P. and A. extractors which had an efficiency of 55%, with the result that the gas passing to the scrubbers is now fog free and the liquor now flowing from these is free from tar, and it is no longer necessary to run off the various compartments in the scrubbing plant. The pressure absorbed is now only 2 to 3 tenths, compared with 2 to 3 in. previously.

The treater on the mixed coal gas-water gas stream has completely eliminated the oily film formerly deposited on the purifying material. It is also believed that the ease and trouble-free operation of the benzole recovery plant is due in no small measure to the elimination of the fog, as no trouble has been experienced with sludging of the wash oil since the detarrers were put into operation.

Conclusion.

In the selection of my subjects I have probably covered much more ground than is customary in an Address of this kind. After a friendly word for the coal owner, I have gate-crashed into the homes of our consumers and examined their requirements for gaseous fuel and home service. I have tried to take an understanding interest in, and show appreciation of, the difficulties experienced by the smaller undertakings, and have put forward suggestions which I hope are constructive. I have had a look round the works and carbonizing plant, the hub of all undertakings, to ascertain if production methods and costs can be improved. I have now only to review, and this very briefly, what we have already accomplished in combating competition. Throughout its whole life the Gas Industry in Scotland has been faced with competition from cheap coal, but notwithstanding this considerable progress has been made. It was anticipated that with the development of electricity we would lose ground; indeed, it was openly stated, and as freely accepted by the public, that there was not room for both services. What has actually happened is illustrated most effectively by the diagram Chart No. 8 compiled from statistics appearing in the published accounts of the Edinburgh Corporation.

The chart illustrates the danger of comparing percentage increases when the absolute figures are not available. It will be observed that over the past fifteen years the sale of electricity locally, that is, excluding bulk and traction supplies and current "exported" to the national grid, has increased by 132 million units, or 550%. During the same period gas output in therms has increased by only 54%, but on a larger initial output, and this increase is equivalent to 192 million units, or a third more than the absolute electrical increase. Similar comparisons I have no doubt can be found elsewhere, and while we may be satisfied with the progress made, there is no justification for complacency.

In these days of changing circumstances it is difficult to forecast the future of any Industry. Our Industry has emerged from the shattering effects of the depression with enhanced prestige, and we are justifiably proud of that accomplishment. To have succeeded with only a limited degree of co-operation and cohesion is evidence that as a united industry we can face the future with supreme confidence. Is it too much to ask that we should in the future make an effort to secure that complete unity which is so necessary to enable the Gas Industry to take its full share in the economic life of the country?

APPENDIX No. 1.

Estimated and Actual Carbonizing Results when Recovering One Gallon Benzole per ton of Coal Carbonized.

[May 16 to Nov. 15, 1936.]

	Estimated.		Actual.		Increment Assuming Equal Gas Outputs.
	Makers.	Departmental.	Last Year.	This Year.	
Gas made	..	..	1,670,183,000 cu ft.	1,746,221,000 cu.ft	..
Make per ton	−840 cu.ft.	−1,300 cu.ft.	17,268 ,,	16 033 ,,	..
Therms	..	76·0	81·93	76·11	..
Coal carbonized	..	..	93.980 tons	108,915 tons	7,789 tons
% increment	5·2%	8·2%			7·7%
Coke produced	..	..	33,887 ,,	39,986 ,,	3,515 ,,
Coke per ton	+ 0·25 cwt.	+0·25 cwt.	7·21 cwt.	7·34 cwt.	
% increment	8·2%	12·0%			9·6%
Breeze produced	..	..	12,478 tons	15 936 tons	2,506 ,,
Breeze per ton	..	..	2·66 cwt.	2·93 cwt.	
Tar per ton	..	−0·34 gall.	15·76 galls.	15·65 galls.	530 ,,

Benzole Balance Sheet.

[Assuming equal gas output.]

Coal, 18s.; coke, 23s. 6d.; breeze, 8s.; tar, 35s.; all per ton.

Extra Coal		£7,010
Less extra Coke	£4,130	
Breeze	1,002	
Tar	927	
		6,059
Benzole replacement cost		951
Steam		274
Water		127
Oil		121
Power		83
Repairs and maintenance		56
Labour		225
Total costs		1,837
Benzole and naphtha revenue		4,848
Gross profit		£3,011

Subject to capital charges, extra labour, &c., in retort house, *less* decreased steam to retorts.

Capital cost of plant £7,000

Benzole made—103,065 galls. at 10·5d. per gall.	£4,509
Naphtha ,, — 16,269 ,, 5d. ,,	339
	£4,848

VOTE OF THANKS.

Mr. GEO. BRAIDWOOD (Coatbridge) proposed a vote of thanks to Mr. Jamieson for his Address. He said the Address covered a large field and proved that in Mr. Jamieson they had a President in close touch with everything that was going on in their Industry. In discussing the coal position Mr. Jamieson expressed the pious hope that the coalowners, in operating the uncontrolled monopoly granted them by the Government, would discharge their responsibilities with wisdom and justice. They heartily endorsed this hope, but very much regretted that, up till now, they have neither seen nor heard of anything to justify it.

The Gas Industry Not Helpless.

However, the Gas Industry was not altogether helpless in this matter, and the coalowners would be well advised to "gang warily" in case their high-priced "chicken" came home to roost. They believed they were being asked to pay more for coal than could be justified, while the conditions which were being laid down with regard to new contracts were quite unreasonable. It was not in the national interest that they should be driven to the use of coke and imported foreign oil in the manufacture of gas. Neither would it be in the interest of either the coalowner or the miner should a drastic lowering of calorific values be necessary in order to reduce their coal consumption.

Circumstances might arise, however, which might cause even "Mr. Therm" to turn.

Co-operation.

They had listened to words of wisdom regarding co-operation, amalgamation, and the question of holding companies. Whether they agree or not with the views expressed, it was certain they must explore every avenue which might lead to a united Gas Industry. This was necessary not only for their own sake, but also for that of the gas consumer. Mr. Jamieson used the word "chaotic" in connection with the arrangements for the sale of coke in Scotland. He did not overstate the case. In view of the high prices they were required to pay for coal, coke was their "trump card," and arrangements should be made to see that it was played correctly.

The stripping of coal gas for the recovery of benzole was of national importance, and it was deplorable to think that it had been found necessary at times to close down the Edinburgh plant owing to shortage of delivery against coal contracts.

It was a pleasure to know of the progress made by the Gas Department in Edinburgh. They knew how much of it was due to Mr. Jamieson's ability and skill. One had only to look at Mr. Jamieson's peak load figures to appreciate that splendid new fields were now being tapped, and that the prospects for gas were far better than most people imagined.

He could not let this occasion pass without making reference to the research work carried out by Mr. Jamieson, at Granton, in connection with the carbonization of cannel coal. The Association was very proud that such valuable information to the Industry should have been submitted by one of its members.

Gas Supply in the West of Scotland.

Mr. Jamieson had not said much about this matter in his Address, probably because he himself was a member of the Commission presided over by Sir Alexander Walker, appointed to investigate and report on the subject. He and the other members were to be complimented on their majority report. As one of the parties keenly interested, he considered the findings and recommendations contained therein essentially practical and if put into operation would result in very great advantage not only to industry, but ultimately to that very important body the domestic gas consumer. It was unfortunate that Glasgow had, so far, been unable to decide as to their attitude with regard to coke oven gas and the proposals were meantime held up because of that. Mr. Dollan's minority report suggested Government control on the lines of the Electricity Grid, but many of them could not see the advantages of such control. One thing was certain, the Gas Industry was not enamoured of Government interference, for, apart from Glasgow, it was anxious to help industry and its own consumers by absorbing and selling all the coke oven gas it possibly could if it could be purchased at a price which would make its resale possible. Glasgow's attitude, however, was not to be blamed altogether for the coke oven gas hold-up. In Lanarkshire alone there was an untapped industrial field for gas, which the Coatbridge Gas Company was anxious to develop, but, so far, it had not been offered coke oven gas by the blast furnace owners. The blast furnace owners would not proceed with the erection of plant until they could be certain of a return on their capital outlays. The Gas Industry, with no help from derating, was willing to take business risks. Why could not the blast furnace owners? Further, it was certain that at this time the sale of the residual coke oven gas at a high price was not essential to the economical manufacture of pig iron.

However, no matter what the outcome of the reports might be, they must congratulate Mr. Jamieson on being appointed to the Commission, and for his efforts on behalf of industry, and the gas supply of the West of Scotland.

Mr. H. A. AITKIN (Buckhaven and Leven), seconding the vote of thanks, said that Mr. Jamieson had happily chosen the subject matter of his Address. Occupying a premier position in the Gas Industry in Scotland, and with data at his disposal not available to the majority of them, his Address came at an opportune time and would take a high place among the Presidential Addresses to the Association. It would afford much guidance to them all, enhanced as it was by expression of the personal views of the President himself giving a lead on many of the subjects to which reference was made.

The President was fortunate in that his year of office coincided with increased activity in industry, expanding gas outputs, and a greater feeling of optimism in regard to future prospects. It would indeed have been passing strange for a century-old industry like the Gas Industry to fail to record the effects of the recent slump period. With a return to more active industrial conditions the Gas Industry had, however, every reason for optimism.

The close association of the Gas Industry with the better utilization of the coal resources of the country would, he did not doubt, compel greater attention to the Industry in the national interests. It was the duty of those engaged in the management of the Industry to develop the Industry meantime to the utmost advantage. The President had indicated in his Address the more clamant needs of the times to this end: Organization, consolidation, and co-operation. Who would gainsay this? The rate of progress might appear somewhat slow considering the many references from time to time to these needs. Yet the progress made of recent years had been not inconsiderable. The various amalgamations and grouping of undertakings would doubtless facilitate yet further progress and were a step in the right direction.

The achievements of the Gas Undertaking of the City of Edinburgh in post-war years well justified Mr. Jamieson's optimism. Their co-operation in all ventures for the benefit of the Industry was invaluable and far-reaching. The high standing of the Edinburgh Gas Undertaking in the regard of the public had its beneficial repercussion up and down the country, and was of material assistance to gas undertakings in other centres. For this assistance and the active part of Mr. Jamieson towards this achievement they paid tribute to their President.

Mr. Jamieson's Reply.

Mr. JAMIESON, responding, expressed his thanks for the kindly references which had been made to his Address. Reference had been made to the work which he had done nationally, and to the technical investigations with which he had been associated, but these formed part of his daily work and he had derived the utmost pleasure from them. If the Industry had benefited in any way, then he was amply compensated for the time which he had allotted to them.

Sixth International Road Tar Conference

Delegates from Many Countries

Delegates from many Continental countries are to attend the Sixth International Road Tar Conference to be held at Prague on May 24, 1937.

At these annual conferences many aspects of the tar treatment of roads are given detailed study. The meetings form a very valuable medium for the exchange of information between the leading technicians of the various countries. A Paper on the study of thin tar carpets will be read by Mr. W. E. Cone, Technical Adviser, the British Road Tar Association, who is among the British delegates.

Measuring Motor Car Exhaust

Gas Meter Reveals Alarming Volumes

Some extremely interesting results were obtained by Messrs. Alder & Mackay, Ltd., when they put a gas meter to what must surely be a new and highly "testing" purpose—viz., the measurement of what, roughly, is the volume of exhaust gas delivered at varying speeds by a light motor van.

The tests were carried out on a 30 cwt. Morris van, with a meter proved within 1% of net at from 300 to 2,000 cu.ft. per hour, and while the readings were very carefully taken they must, of course, be regarded as approximate, inasmuch as the engine speeds were the van driver's estimate of what his "revs." and throttle position were at the several speeds metered. Here are the results of three tests:

1st Test.—Engine "ticking over," as in a traffic block. Volume of exhaust gas leaving silencer pipe at the rate of 350 cu.ft. per hr.

2nd Test.—Engine running moderately hard, as if travelling along a busy road. Volume of exhaust gas 1,285 cu.ft. per hr.

3rd Test.—As if at a steady 30 m.p.h. Volume of exhaust gas 2,120 cu.ft. per hr.

From the above one can readily imagine the throughput of the hundreds of exhaust pipes, side by side, during a rush hour hold-up at Hyde Park Corner, or in any of the well-known City traffic "jams," with its intensified effect as hundreds of vehicles "rev. up" their engines when the traffic starts moving again.

Is there any truth, we wonder, in the rumour that Messrs. Alder & Mackay's next effort at measuring waste gases may possibly involve the fitting of a very large high-capacity meter in Geneva in time for the next Plenary Session of the League of Nations.

The Hong Kong & China Gas Company, Ltd.

The Annual General Meeting of the Shareholders of the Hong Kong and China Gas Company, Ltd., was held at the Company's Offices, 148, Gresham House, Old Broad Street, E.C., on Monday, April 5, 1937—Mr. ROBERT H. GLEN, F.C.A. (Chairman), presiding.

The SECRETARY (Mr. S. F. Field) read the notice convening the Meeting and the Auditors' Report.

The CHAIRMAN: Gentlemen, A copy of the Report and Statement of Accounts having been sent to all Members, I will ask you to take them as read.

Before I deal with the Accounts which are being presented at to-day's Meeting, I should like to make a brief reference to the conditions generally which have prevailed throughout the year ended Dec. 31 last.

In my address to you at the last General Meeting I referred to the violent exchange fluctuations which had occurred during 1935. The rate was 1s. 8¼d. per dollar at the beginning of that year. At the end of April it had risen to 2s. 6d. per dollar and at the end of 1935 the rate was down to 1s. 3½d. During the past year the exchange has not varied to any appreciable extent as will be seen from the fact that the average rate for the whole of the year under review was 1s. 3$\frac{7}{16}$d. per dollar.

This more or less stable rate of exchange has undoubtedly done much to restore confidence into the general trade of Hong Kong and reports received from our Hong Kong Office indicate improved business conditions. As regards our own particular business we show increases in gas sales of 1¾ million cu.ft. at Hong Kong and 1 million cu.ft. at Kowloon over the previous year—the increase at Hong Kong would have been greater but for the closing down of one of the largest hotels, where an appreciable quantity of gas was consumed.

Turning now to the Accounts, I will first refer to the Capital Accounts. The additions to Land, Works, and Plant amount to only £3,115, this expenditure being mostly in respect of Mains and Services laid. A sum of £5,082 has been written out of Capital, the principal items being part value of one of the Company's gasholders at Wanchai now dismantled. This holder was erected in the year 1896 and it is the intention of the Board to re-erect this holder, at some later date, on the Kennedy Town site, where the tank and other usable portions of this structure are stored.

Dealing next with the Revenue Account the cost of coal carbonized is less by $13,391. Although nearly 700 tons more coal was carbonized during 1936, the cost per ton was more favourable. I might here perhaps just divert to refer to the cost of coal in the future. You are aware that our coal has been mostly obtained from Japan at a reasonable cost but, owing to the severe decline in the dollar, the cost of this coal is now appreciably higher; in fact, approximately double the price of that ruling during 1935 when we last contracted. I need hardly say that this is a matter to which your Directors are giving their special consideration.

The cost of C.W. Gas is lower by $1,415, less Water Gas being made during 1936.

Working Expenses total $190,557 as compared with $171,253 which is mostly accounted for by the drop in exchange. As an instance, our European Officials are paid in dollars at the rate ruling on day of payment and it will therefore be appreciated that when the exchange is low, more dollars are required to pay £1 Sterling than when the dollar is high.

The cost of maintaining the retorts and C.W.G. plant is $37,042 as compared with $10,231. The higher charge during 1936 being for new retort material for our No. 3 vertical setting. This exceptional expenditure should not recur for some years.

The figure for maintaining Mains is $15,254 as against $10,252 for the previous year.

There is an appreciable increase in the cost of Maintenance of Works over the previous year, the figure being $23,593. The reason for this increase is that a number of large repairs have been carried out. The top lift of our 100,000 cu.ft. holder at Kowloon has been re-sheeted and in addition all other gasholders have been overhauled and put in good condition.

Fittings Repairs cost about the same as the previous year.

Bad Debts Account I am pleased to say again shows a reduction, the figure being $670 for 1936 as compared with $2,310 for year 1935.

Publicity cost $4,195, which is $288 less than previously. It may here interest Shareholders to know that gas cooking demonstrations were held in Hong Kong from Nov. 25 until Dec. 23 from Monday to Friday each week.

The demonstrations were well attended and our Manager reports he is quite satisfied that the publicity obtained will be to the benefit of the Company.

Obsolete Fittings written off is $7,309 as compared with $15,679.

Showrooms Account is higher by $4,527. During the year additional showroom space was taken over on advantageous terms and this will enable the Company to exhibit a more extensive range of our various gas appliances.

Bonus to Staff and Workmen at $21,145 is $5,221 lower than for the previous year.

Depreciation of meters, stoves, &c., on hire is $31,426 and $9,845 more than for year 1935. Depreciation is charged at a fixed percentage on the Sterling balances and then converted into dollars at the average exchange rate. The lower rate during 1936 accounts for the higher figure.

On the credit side of the Hong Kong Revenue, Gas Rentals is higher by $19,229. The price of gas was increased from Jan. 1, 1936, and in addition to this nearly 3 million cu.ft. more gas sold during the year.

The Revenue from Fittings Rental was $82,462 as compared with $85,358.

Residual Products is lower by $1,700. Although the quantity of both coke and tar sold was more than the previous year the prices obtained were slightly less. Recent reports from Hong Kong indicate that the demand for our residuals has so increased that difficulty is found in supplying all our customers.

The total number of public lamps fixed at Dec. 31 last is 2,620 or an increase of 13 during the year.

The Hong Kong Revenue balance at $220,971 is $49,870 lower than the previous year, the abnormal expenditure during the year to which I have previously referred is mainly responsible for the showing of this decreased figure. This dollar balance of $220,971 is brought into the London Revenue Account at the average rate of 1s. 3$\frac{7}{16}$d. as compared with 1s. 11$\frac{7}{16}$d. average for 1935. It will be appreciated that the low rate ruling throughout the year under review has had an adverse effect on the Sterling balance of the London Revenue which is £12,091 as compared with £23,569.

I do not think any items appearing in the Net Revenue Account call for special mention so I will deal now with the General Balance Sheet. The figure for Loan from Bankers at Hong Kong and London is £27,723 as compared with £29,127.

There is one Account to which I desire to draw Shareholders' attention and that is the Gasholder Suspense Account which stands at £14,998. You will remember that on May 14, 1934, a serious accident occurred to our 500,000 cu.ft. holder at West Point Works resulting in many Chinese lives being lost, a number injured, and in addition to this, the surrounding dwelling-houses suffered damage through the resulting fire. Several claims were lodged against the Company in respect of same and after reviewing the whole position in conjunction with the best legal advice obtainable, the Directors decided to compromise, the claims being submitted to arbitration.

It is very difficult at the present time to say what the actual cost to the Company will be, as many of the claims have been found to be grossly exaggerated.

During the early morning of Aug. 17 last the Colony was visited by a severe typhoon, which the local Press described as the severest experienced since 1923. Although considerable damage was done to shipping and buildings, I am pleased to say this Company's property suffered very little.

The 500,000 cu.ft. gasholder at Ma Tau Kok, which was three-quarters full of gas, stood up very well and no damage was done. This is the first typhoon that has been experienced since the Jordan Road lamps which are fixed on bracket arms were erected and they stood up very well, only one lamp being damaged by losing the glass globe.

Business generally in the Colony, I have before remarked, is improving. The demand for our products is very satisfactory and the policy adopted of putting out the most up-to-date appliances has been well justified and has been appreciated by consumers.

Your Directors look to the future with confidence.

Before concluding, I should like to refer to the fact that I have had the honour of being a Director of this Company for 25 years. During this time many changes have taken place, none of the Directors with whom I was first associated are here to-day. There have been ups and downs but the downs have always been followed by the ups. I hope still to serve the Company for many more years.

I now have pleasure in moving that the Report and Accounts be received and adopted.

Mr. ALEX. A. JOHNSTON seconded the resolution, which after Shareholders' questions had been answered, was carried unanimously.

The CHAIRMAN then moved the following resolution:

> "That a Dividend on the Company's Capital at the rate of 6% per annum, subject to income-tax, be declared for the year ended Dec. 31, 1936, less 3% interim dividend paid Oct. 30, 1936, the Warrants to be made payable on April 9, 1937,"

which was seconded by Mr. H. ROYSTON ASKEW and unanimously carried.

The re-election of Mr. H. Royston Askew as a Director was

proposed by the CHAIRMAN, who said: "Mr. Royston Askew has been a Director now for some years and I do not think I can exaggerate his value to the Board with his great knowledge of Gas as an Industry and from his unique angle from the legal side."

Mr. A. W. OKE seconded the proposition which was carried unanimously.

Mr. H. ROYSTON ASKEW briefly responded.

Mr. A. W. OKE proposed the re-election of Messrs. Cash, Stone, & Co. as Auditors for the ensuing year at the usual fee, which was seconded by Mr. W. S. VENNER and unanimously carried.

The CHAIRMAN then moved a vote of thanks to the Staff, both in Hong Kong and London. In Hong Kong they were fortunate in having a very good staff from Mr. Stone right down to the lowest coolie. The Company had only eight or nine Europeans in Hong Kong and they were a loyal and industrious staff. Although conditions in Hong Kong were better than they were twenty-five years ago, they were still heavier than those of a Gas Company in England and they had a staff able to act in an emergency as had been proved. The Chinese Staff were admirable workers who served them long and faithfully. When last in Hong Kong he met one of the Chinese Staff whose son and grandson were also in the Company's service.

In London, at the head, was Mr. Field, who really was the finest company secretary he had met. He managed to satisfy the demands and questions of the Board and was always up-to-date with such things as the annual accounts. Mr. Field had a small but very energetic and capable staff and the Company could not be better served in London.

Mr. H. ROYSTON ASKEW seconded the vote, which was carried unanimously.

The SECRETARY briefly responded.

Mr. A. W. OKE proposed a vote of thanks to the Chairman and Directors. He congratulated Mr. Robert H. Glen on having been so long a Director of the Company.

Mr. W. S. VENNER seconded and the Resolution was carried unanimously.

The CHAIRMAN briefly replied and the proceedings then terminated.

Manchester and District Juniors

Annual Dinner

The thirty-seventh Annual Dinner of the Manchester and District Junior Gas Association was held at the Engineers' Club, Manchester, on Saturday, April 3, and proved to be the most successful function ever held in connection with the Association. A special invitation had been sent to each past-President, and the enthusiasm displayed was remarkable. Twenty-six past-Presidents and nearly 100 members and guests were present. After dinner each past-President introduced himself in a one-minute speech, so that the history of the Association from its inception in 1898 downwards was briefly described.

The toast to the "Past-Presidents and Founders" was ably proposed by Mr. D. Benson, who paid tribute to the hard work that had been done in the past, with the result that the membership has increased from 20 to 300 members. He thanked the Seniors for their interest and also for the facilities granted to the Juniors, which enabled so many of them to attend the meetings.

In reply, Mr. R. T. Stoddard, M.B.E. (First Joint Secretary), said that he was pleased that the work done in the early days was appreciated, for it was not all plain sailing. As one who took an active part in the affairs of the Association as far back as 1898, he would like to say that a great deal of encouragement was given by certain members of the Senior Association. He would mention in particular Mr. T. Duxbury, who was always ready to give the benefit of his experience. He would also like to pay tribute to the excellent work that was done by the editors of two technical papers at that time, Mr. Stewart of the *Gas World* and Mr. W. King of the "JOURNAL," who were always ready to give publicity to the proceedings of the Association. Considerable assistance was also given by contractors. They offered a willing hand by opening their works on a Saturday afternoon, and placing their technical staff at the disposal of the members. The development of the Gas Industry had not only been within the Industry, but valuable assistance had come from without.

Mr. G. Dixon (Nottingham) also responded in light vein, saying that while some made a living by pure ability, others by pure personality, and others by sheer good luck, there were some who made it by damned impertinence.

Those who had been Presidents of the Association carried that honour throughout the whole of their lives. Despite greater competition and educational schemes, he was of the opinion that the Junior of to-day had a better time than those of twenty years ago, and he was pleased to observe that every advantage was being taken of it. It was the intention of the past-Presidents to present a President's Medallion to the Association.

Mr. S. E. Halliwell (Bristol), in proposing "The Junior Gas Associations," said that he was proud of the work that had been done by the Juniors throughout the country. It was a great personal pleasure to him to be among his friends of so many years ago. The successful gathering that night was a tribute to those who had started the Association.

Mr. E. R. B. French (Leeds), President of the Yorkshire Junior Gas Association, responded to the toast.

Mr. J. Albinson, B.Sc., proposed "Our Guests," and the response was by Councillor Williams (Chairman of the Widnes Gas Committee).

Mr. Franklin Thorp said the Association had been blessed with loyal supporters in the past, and he would like to point as an example to Alfred Holton, who had done more for the Association than any other man alive.

"The President" was proposed by Mr. R. N. Webb, President of the Manchester District Association of Gas Engineers, and in reply, Mr. T. Caldwell said that all who came into contact with the Manchester and District Junior Gas Association must appreciate that it was no mean Association of no mean industry. The Association was founded for the purpose of increasing the welfare of the Industry and its members, and whether judged by the benefits which had accrued to the latter, or both, there was ample evidence that from its inception it had been progressively fulfilling its aim. There were present 26 past-Presidents, two of whom were founders, and also the two first Secretaries. Many of these gentlemen were now holding high positions in the Gas Industry, and their presence testified to the esteem they felt for the Association. The younger members were successfully endeavouring to uphold the high traditions of the past. The number of members attending the meetings was increasing; also the Papers submitted were of a high standard, last session the Bronze Medal of The Institution of Gas Engineers being awarded to one of their members. Theirs was the first Junior Association to be formed, and the efforts of the present members were helping to keep it in the vanguard of progress.

Conspiracy and Protection of Property Act, 1875

Section 4 in Poster Size

For the convenience of those for whom it is necessary to post on gas-works a copy of Section 4 of this Act, the "GAS JOURNAL" has for many years kept in stock copies printed in poster size. These are obtainable on application to the "JOURNAL" office, 11, Bolt Court, Fleet Street, E.C. 4, at 6d. each, or specially mounted at 2s. each.

Gas Institute of New Zealand

Timaru Meeting

A Meeting of the Council and Executive of the Gas Institute of New Zealand was held at Timaru on Feb. 2. Those present included the President, Mr. A. Morrie Taylor (Timaru), Messrs. F. W. J. Belton (Christchurch), J. Grenfell (Oamaru), H. C. Ridley, Auditor (Christchurch), and G. A. MacFarlane (Christchurch).

Owing to the new Labour legislation creating so much additional work for executives of gas undertakings throughout New Zealand, it was found impossible to get technical papers for the Annual Conference which should have taken place at Timaru in February, and consequently the Council held its meeting at Timaru in order to pass the annual report and balance-sheet.

The Council decided that Mr. A. Morrie Taylor be appointed President for a further year, and that the annual conference of the Institute be held at Timaru in February, 1938.

The following officers were elected: President, Mr. A. Morrie Taylor, Timaru; Vice-President, Mr. G. H. Collins, Auckland; Council, Messrs. F. W. J. Belton, Christchurch; Jas. Lowe, Auckland; M. J. Kennedy, Wellington; J. J. Hurley, Christchurch; J. H. Grenfell, Oamaru; W. B. O'Toole, Invercargill; Auditor, Mr. H. C. Ridley, Christchurch; Trustee, Mr. J. Hungerford, Wellington.

The following life-members of the Institute were appointed: Messrs. H. W. Atkinson (Auckland). J. Bradley (Westport), C. Frye (Dunedin), H. C. Ridley (Christchurch).

The President referred to the loss the Institute had suffered by the passing of Mr. E. Rabbidge, consulting gas engineer, of Wellington.

ALWAYS IN STOCK

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12 Feet Lengths	18 Feet Lengths
DIAMETER	DIAMETER
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6	6
7	7
8	8
9	9
10	10
12	12

Vertically Cast Iron Pipes

9 Feet Lengths	12 Feet Lengths
DIAMETER	DIAMETER
ins.	ins.
3	—
4	4
6	6
8	8
9	9
10	10
12	12
	15
	18
	24

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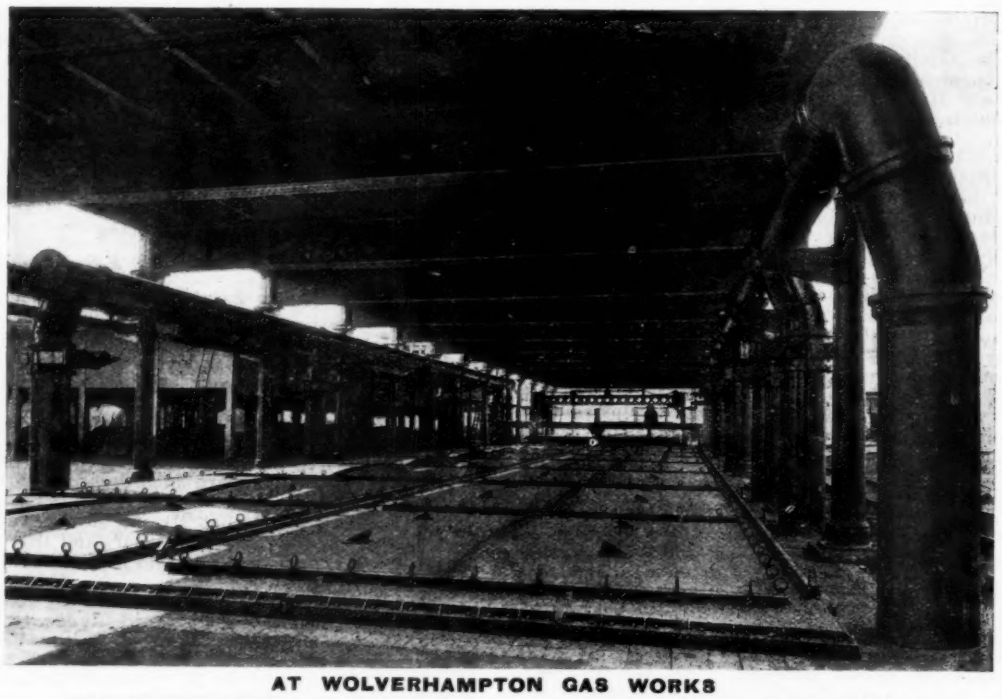

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Gas Markets and Manufactures

Stock Market Report

(For Stock and Share Lists, see later pages)

The rumour that the United States Treasury contemplated a reduction in the price of gold led to a slump in mining shares last week, while the consequent sharp set-back in commodity prices brought down base metal shares with a rush. The subsequent denials of any change in policy, however, caused a last minute recovery to take place, though the time was too short for prices to revert to anything approaching their former levels. It was a satisfactory feature that the gilt-edged market remained steady throughout the week, and several stocks closed fractionally higher. Home rails, despite the good traffic returns covering Easter, continued dull, and several issues appear attractive at current prices. Industrials were erratic in sympathy with the mining groups, and oil, rubber, and tea shares were reactionary.

Business in the Gas Market was heavier than for the past two weeks, but still below normal, and prices with few exceptions closed unchanged. Gas Light units were in good demand, and though recorded transactions on Friday were 7½d. higher than the previous week's best, the quotation was marked up a modest 3d. only to 25s. 3d. South Metropolitan 6% Preference hardened to 134½, while at the Provincial Exchange Newcastle units also made further recovery.

Since the gilt-edged market appears to have settled down to a new level, which is considerably below last year's highest, it is reasonable to assume that gas debenture stocks have followed a similar course. The table given below is a comparison of last year's prices with the current middle market price and the yields on the latter, which on the whole are about ¼% more than those obtainable on last year's highest prices.

Debenture Stocks.

—	Highest, 1936.	Lowest, 1936.	Present Price.	Yield on Present Price. %.
				£ s. d.
Alliance and Dublin 4%	101¼	100⅞	98½	4 1 2
Bournemouth 5%	129½	124½	119½	4 3 8
Commercial 3%	88¼	84	75½	3 19 5
,, 5%	125½	122	117½	4 5 1
Croydon 5%	128¼	123	117½	4 5 1
Gas Light 3%	93¼	83½	79½	3 15 5
M.S. Utility 4%	108	104	99½	4 0 4
,, 5%	127	123	117½	4 5 1
South Suburban 5%	128	121	117½	4 5 1
,, 4%	108¼	105⅛	100½	3 19 7
Tottenham 4%	108	105	100½	3 19 7
Wandsworth 5%	131⅜	124½	119½	4 3 8
,, 4%	106	105	100½	3 19 7

Current Sales of Gas Products

The London Market for Tar Products.

LONDON, *April* 12.

There are a few changes to report in the prices of tar products, to-day's values being as follows:

Pitch, 36s. to 37s. per ton f.o.b.

Creosote, 6d.

Refined tar, 3¾d.

Pure toluole, 2s. 4d. to 2s. 5d.; pure benzole, 1s. 7d. to 1s. 8d.; 95/160 solvent naphtha, about 1s. 8d.; and 90/160 pyridine, about 9s.; all per gallon naked at makers' works.

Tar Products in the Provinces.

April 12.

The average prices of gas-works products during the week were: Gas-works tar, 21s. 6d. to 26s. 6d. Pitch—East Coast, 35s. to 36s. f.o.b. West Coast—Manchester, Liverpool, Clyde, 35s. to 36s.* Toluole, naked, North, 2s. to 2s. 1d. Coal tar crude naphtha, in bulk, North, 8½d. to 8¾d. Solvent naphtha, naked, North, 1s. 5d. to 1s. 6d. Heavy naphtha, North, 1s. 2d. to 1s. 3d. Creosote, *ex* works, in bulk, North, liquid and salty, 5d. to 5½d.; low gravity, 4⅝d. to 4¾d. Heavy oils, in bulk, North, 5d. to 5¼d. Carbolic acid 60's, 3s. to 3s. 1d. Naphthalene, £18 to £20. Salts, 90s. to 95s., bags included. Anthracene "A" quality, 4½d. to 4¾d. per minimum 40% purely nominal; "B" quality, unsalable.

* All prices for pitch are now quoted on the basis of f.o.b. In order to arrive at the f.a.s value at any port it will be necessary to deduct the loading costs and the tolls whatever they may be.

Tar Products in Scotland.

GLASGOW, *April* 10.

Business continues quite brisk and prices are steady accordingly. In tar acids there is still a good volume of business being conducted at the comparatively high prices now being quoted.

Crude gas-works tar.—The actual value is 36s. to 37s. per ton *ex* works in bulk.

Pitch.—Quotations are more or less nominal at 30s. to 32s. 6d. per ton f.o.b. Glasgow for export, and 30s. per ton *ex* works in bulk for home trade.

Refined tar is being enquired for in quite substantial quantities and quotations are now round 3d. to 3⅛d. per gallon free on rails for export, and 3½d. to 3¾d. per gallon *ex* works in buyers' packages for home trade.

Creosote oil.—Good enquiry exists and prices are not lower than the following: Specification oil, 5⅛d. to 5⅜d. per gallon; low gravity, 5¾d. to 6d. per gallon; neutral oil, 5¼d. to 5½d. per gallon; all *ex* works in bulk.

Cresylic acid.—Available supplies are being rationed out, and to-day's values are as under: Pale, 97/99%, 4s. 1d. to 4s. 3d. per gallon; dark, 97/99%, 3s. 10d. to 4s. per gallon; and pale, 99/100%, 4s. 6d. to 4s. 9d. per gallon; all *ex* works in buyers' packages.

Crude naphtha.—Available supplies are commanding 6d. to 6½d. per gallon *ex* works in bulk, according to quality and district.

Solvent naphtha.—90/160 grade is now 1s. 4½d. to 1s. 5½d. per gallon, and 90/190 heavy naphtha is 11d. to 1s. per gallon.

Motor benzole is valued at 1s. 4d. to 1s. 4½d. per gallon.

Pyridine.—Prices are nominal at 7s. to 8s. per gallon for 90/160 grade, and 8s. to 9s. per gallon for 90/140 grade.

Benzole Prices.

These are considered to be the market prices for benzole at the present time:

	s. d.		s. d.	
Crude benzole	0 9½	to	0 10	per gallon at works
Motor ,,	1 3	,,	1 3½	,, ,, ,,
90% ,,	1 4	,,	1 4½	,, ,, ,,
Pure ,,	1 8	,,	1 8¼	,, ,, ,,

Contracts Advertised To-Day

Retorts.

Skipton U.D.C. Gas Department. [p. 118.]
Sutton-in-Ashfield Gas Department. [p. 118.]

Further Gas Undertakings' Results

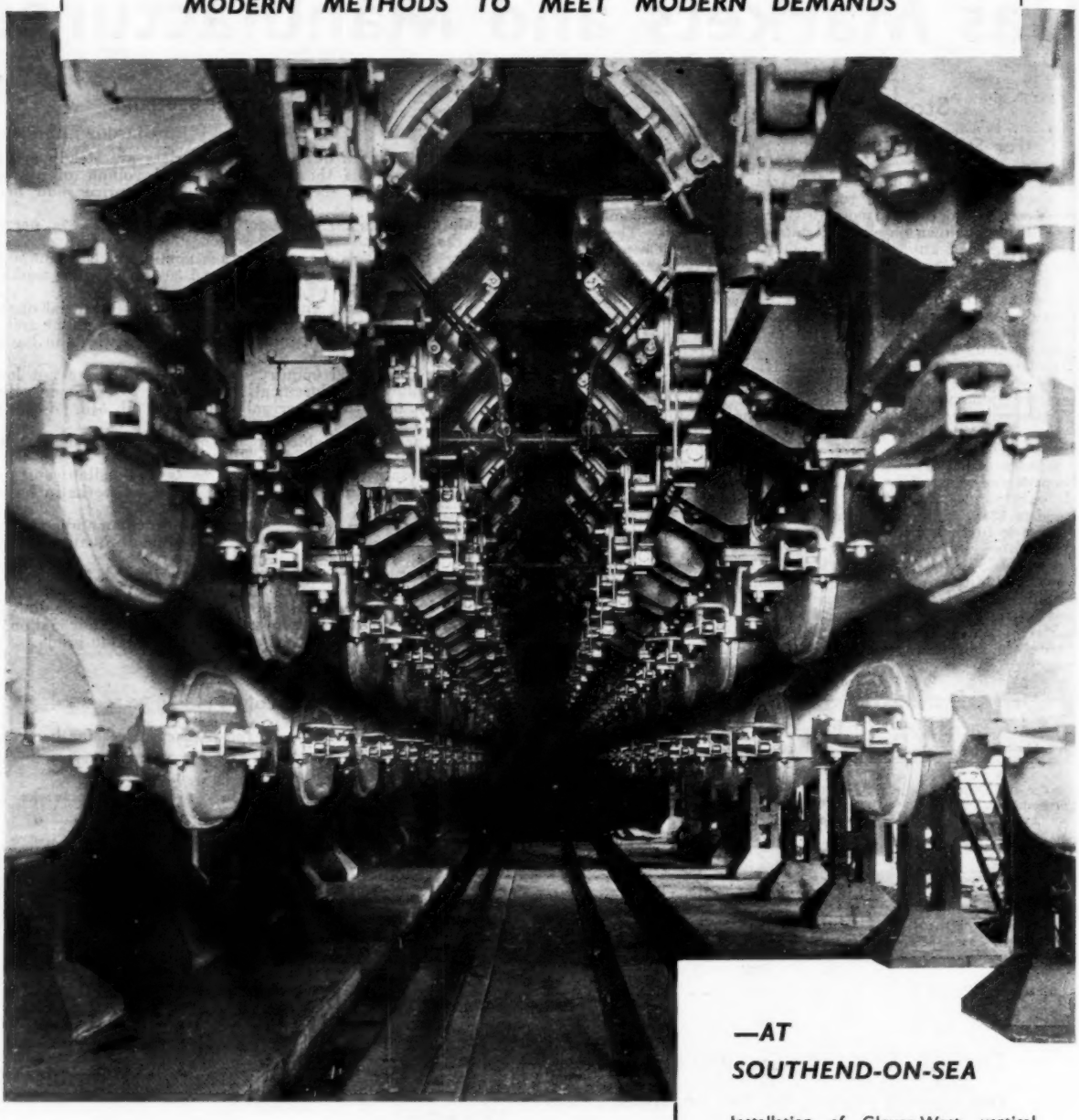
Laurencekirk.

The report of the Laurencekirk Lighting Society showed that during 1936 the amount of gas sold was 9,148,000 cu.ft., representing an income of £2,336. The profits for the year amounted to £121.

Luton.

The report of the Directors of the Luton Gas Company for the year ended Dec. 31, 1936, states that gas sold during the year totalled 4,930,081 therms (1,004,098,000 cu.ft.), an increase over 1935 of 439,449 therms (89,683,400 cu.ft.), or 9·8%. The number of consumers has increased by 2,595. After providing for the debenture interest and other charges, transferring £302 to the reserve fund, and the payment of the dividend for the half-year ended June 30, 1936, there remained a balance on the net revenue account of £21,956. During the year 1,043 cookers, 101 heating appliances, 331 water heaters, 51 wash coppers, and 12 refrigerators, as well as 3,000 gas fittings, were sold at the showroom. Further, some 1,300 additional cookers had been let out on hire. The rapid expansion of the Company necessitated the issue of a further £28,000 consolidated ordinary stock "A." The total applied for amounted to £37,770, and the average price at which the stock was allotted was £177 2s. 5d. per £100. The pension fund is now in full working order, and proving most beneficial. The following dividends have been declared for the half-year ended Dec. 31, 1936: £2% on Class "B" preference shares, making £4% for the year; £2 10s.% on Class "C" preference shares, making £5% for the year; £4 7s. 6d.% on consolidated ordinary stock "A," making £8 15s.% for the year; £3 12s. 6d.% on consolidated ordinary stock "B," making £7 5s.% for the year.

MODERN METHODS TO MEET MODERN DEMANDS



—AT
SOUTHEND-ON-SEA

Installation of Glover-West vertical retorts which has now begun regular service at the Southend-on-Sea Station of the Gas Light and Coke Company (London). A view below the retort bench showing coke extractors, coke discharging mouthpieces and West lip bucket conveyors.

405 West-built carbonizing plants erected totalling **10,556** retorts and chambers with a nominal daily make of **579** million c.ft.

THE WEST SYSTEMS

GLOVER-WEST VERTICAL RETORTS ● WESTVERTICAL CARBONIZING CHAMBERS

WEST'S GAS IMPROVEMENT COMPANY, LTD.

MANCHESTER: Albion Ironworks, Miles Platting
'Phone: COLLYHURST 2961 : 'Grams: "STOKER, MANCHESTER"

LONDON: Columbia House, Aldwych, W.C.2
'Phone: HOLBORN 4108 : 'Grams: "WESGASCO, ESTRAND, LONDON"

STOCK AND SHARE LIST

Official Quotations on the London Stock Exchange

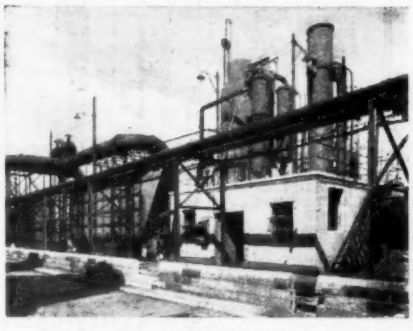
Issue. £	Stock or Share	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations Apl. 9.	Rise or Fall on Week.	Transactions, Lowest and Highest Prices During the Week.
1,767,439	Stk.	Mar. 15	8	8	Alliance & Dublin Ord. ...	162—167	...	...
374,000	,,	Dec. 14	4	4	Do. 4 p.c. Deb. ...	96—101	...	...
558,890	,,	Feb. 15	7	7	Barnet Ord. 7 p.c.	160—165	...	...
300,000	1	Apl. 5	1 4½	1 9½	Bombay, Ltd.	25 6—27 6*	—/6	26,3
179,915	Stk.	Mar. 1	9½	9½	Bournemouth sliding scale ...	195—205	...	...
590,407	,,	,,	7	7	Do. 7 p.c. max. ...	163—168	...	...
493,960	,,	,,	6	6	Do. 6 p.c. Pref. ...	133—138	...	...
50,000	,,	Dec. 14	3	3	Do. 3 p.c. Deb. ...	80—85	...	82
262,025	,,	,,	4	4	Do. 4 p.c. Deb. ...	100—105	...	...
335,000	,,	,,	5	5	Do. 5 p.c. Deb. ...	117—122	...	...
357,900	,,	Feb. 15	7½	7½	Brighton, &c., 6 p.c. Con. ...	155—160	...	...
649,955	,,	,,	6½	6½	Do. 5 p.c. Con. ...	140—145	...	...
205,500	,,	,,	6	6	Do. 6 p.c. 'B' Pref.	130—135	...	...
855,000	,,	Mar. 1	7	8	British Ord.	150—155	...	150
100,000	,,	Dec. 14	7	7	Do. 7 p.c. Pref.	143—148	...	...
350,000	,,	,,	5½	5½	Do. 5½ p.c. 'B' Cum. Pref.	110—115	...	...
120,000	,,	,,	4	4	Do. 4 p.c. Red. Deb. ...	95—100	...	96
450,000	,,	,,	5	5	Do. 5 p.c. Red. Deb. ...	103—108	...	...
450,000	,,	,,	3½	3½	Do. 3½ p.c. Red. Deb. ...	95—100	...	...
100,000	10	22 May '33	6	4	Cape Town, Ltd.	1—3	...	...
100,000	10	6 Nov.'33	4½	4½	Do. 4½ p.c. Pref. ...	1½—3½	...	38/-
150,000	Stk.	Jan. 4	4½	4½	Do. 4½ p.c. Deb. ...	80—85	...	...
626,860	,,	Feb. 1	6	6	Cardiff Con. Ord.	120—125	...	...
237,860	,,	Dec. 14	5	5	Do. 5 p.c. Red. Deb.	107—112	...	...
98,936	1	Apl. 5	2/-	2/-	Colombo Ord.	1⅝—1⅞*	...	...
24,510	1	,,	1/4½	1/4½	Do. 7 p.c. Pref. ...	23/—25/-*	—/6	...
739,453	1	Mar. 15	-/11·48	-/11·48	Colonial Gas Assn. Ltd. Ord.	17/—19/-	...	18.9
296,144	1	,,	1 3·30	1 3·30	Do. 8 p.c. Pref.	22/—24/-	...	23/-
1,775,005	Stk.	Feb. 1	5	5	Commercial Ord.	88—93	...	91—92
620,000	,,	Nov. 30	3	3	Do. 3 p.c. Deb. ...	73—78	...	75
286,344	,,	Feb. 15	5	5	Do. 5 p.c. Deb. ...	115—120	...	...
807,560	,,	Feb. 15	7	7	Croydon sliding scale ...	145—150	...	146¾
644,590	,,	,,	5	5	Do. max. div.	109—114	...	111½—112
620,385	,,	Dec. 14	5	5	Do. 5 p.c. Deb.... ...	115—120	...	116
239,000	,,	Feb. 1	5	5	East Hull Ord. 5 p.c. ...	100—105	...	...
185,355	,,	Feb. 15	6	6	East Surrey Ord. 5 p.c. ...	122—127	...	...
176,211	,,	Dec. 14	5	5	Do. 5 p.c. Deb. ...	113—118	...	...
250,000	1	Nov. 16	6	4	Gas Consolidation Ord. ...	20/—22/-	...	...
250,000	1	,,	4	4	Do. 4 p.c. Red Cum. Pref.	19/—21/-	...	20/-
19,255,284	Stk.	Feb. 1	5½	5½	Gas Light & Coke 4 p.c. Ord.	24·9—25·9a	+-/3	25/11—25/10½
2,600,000	,,	,,	3½	3½	Do. 3½ p.c. max.	76—81	+1	77½—81
4,477,106	,,	,,	4	4	Do. 4 p.c. Con. Pref. ...	99—102	...	99½—101
8,602,497	,,	Nov. 30	3	3	Do. 3 p.c. Con. Deb. ...	78—81	...	78½—80
3,642,770	,,	,,	5	5	Do. 5 p.c. Red. Deb. ...	110—113	...	112
3,500,000	,,	,,	4½	4½	Do. 4½ p.c. Red. Deb....	108—111	...	109½—110½
700,000	,,	Mar. 1	25 5/8	3½	Do. 3½ p.c. Red. Deb....	98—101	+1	100—101
270,466	,,	Feb. 15	6	6	Harrogate New Cons. ...	122—127	...	...
213,200	,,	Feb. 15	6	6	Hornsey Con. 3½ p.c. ...	125—130	...	...
5,600,000	,,	Nov. 2	12	8	Imperial Continental Cap. ...	157—162	...	158—161½
223,130	,,	Feb. 1	3½	3½	Do. 3½ p.c. Red. Deb. ...	90—95	...	90—91½
285,242	,,	Mar. 1	8½	8½	Lea Bridge 5 p.c. Ord. ...	160—165	—5	...
11,751	,,	Mar. 1	8	10	Maidstone Gas 5 p.c. Cap. Stk.	180—190	...	...
63,480	,,	Dec. 14	3	3	Do. 3 p.c.Prp.Db.Sk	72—77	...	73
75,000	,,	Nov. 30	†10	†10	Malta & Mediterranean ,, Metropolitan (of Melbourne)	150—160	...	...
392,000	—	Apl. 1	5½	5½	5½ p.c. Red. Deb.	98—103	...	...
231,978	Stk.	Feb. 15	5	5	M.S. Utility 'C' Cons. ...	102—107	...	...
968,657	,,	,,	4	4	Do. 4 p.c. Cons. Pref.	95—100	...	96—98
360,075	,,	Dec. 14	4	4	Do. 4 p.c. Deb. ...	97—102	...	...
148,955	,,	,,	5	†5	Do. 5 p.c. Deb. ...	115—120	...	...
125,000	—	Jan. 4	3½	3½	Do. 3½ p.c. Rd.Rg.Bds.	97—100	...	...
675,000	Stk.	Nov. 16	†6	†6	Montevideo, Ltd.	83—88	...	...
250,000	,,	Feb. 15	7½	7½	North Middlesex 6 p.c. Con.	160—165	...	162
396,160	,,	Feb. 1	5	5	Northampton 5 p.c. max. ...	102—107	...	...
300,000	,,	Nov. 2	†7	†9	Oriental, Ltd....	165—170	...	167
416,617	,,	Dec. 14	8	8	Plymouth & Stonehouse 5 p.c.	170—175	...	167
621,667	,,	Feb. 15	8½	8½	Portsmouth & Gosport Cons.	170—175	...	...
241,446	,,	,,	5	5	Do. 5 p.c. max. ...	105—110	...	...
73,350	,,	,,	...	5	Do. 5 p.c. Pref. ...	112—117	...	...
363,470	1	Sept. 21	1/-	1/-	Severn Val. Gas Cor. Ld. Ord.	20/—22/-	...	...
454,510	1	Mar. 15	-/10½	-/10½	,, ,, 4½ p.c. Cum. Pref.	20/—22/-	,,	20/6
133,201	Stk.	Feb. 15	5	8½	Shrewsbury 5 p.c. Ord. ...	133—138	...	...
90,000	10	June 8	‡3½	‡4	South African...	4—5	...	...
1,152,635	1	Sept. 7	1/2½	1/2½	South East'n Gas. Cn.Ld. Ord.	24-/—26/-	...	24/6—25/6
845,511	1	Mar. 1	-/10½	-/10½	Do. 4½ p.c. Red. Cum. Pref.	20/—22/-	...	20/6—21/-
200,000	1	,,	4	4	Do. 4 p.c. Cum. Pref. ...	19/6—21/6	...	...
450,000	,,	Feb. 15	4	4	Do. 4 p.c. Deb.	100—102	...	102
150,000	Stk.	,,	3½	3½	Do. 3½ p.c. Red. Deb. ...	99—101	...	...
6,709,895	,,	Feb. 1	5	6	South Met. Ord.	107—112	...	107—109
1,135,812	,,	,,	6	6	Do. 6 p.c. Irred. Pf. ...	132—137	+1	131½
850,000	,,	,,	4	4	Do. 4 p.c. Irred. Pf. ...	96—101	...	...
1,895,445	,,	Dec. 14	3	3	Do. 3 p.c. Deb. ...	74—79	...	78
1,000,000	,,	Jan. 4	5	5	Do. 5 p.c. Red. Deb....	107—112	...	111—112
1,543,795	,,	Feb. 1	6	6	South Suburban Ord. 5 p.c....	122—127	...	...
512,825	,,	,,	5	5	Do. 5 p.c. Pref....	112—117	...	114—114½
500,000	,,	,,	4	4	Do. 4 p.c. Pref....	95—100	...	95—97
888,587	,,	Dec. 14	5	5	Do. 5 p.c. Deb....	115—120	...	117—118
250,000	,,	,,	4	4	Do. 4 p.c. Deb....	98—103	...	...
427,859	1	Nov. 16	1/2⅜	9½	S. Western Gas & Water Ord.	20/—22/-	...	...
160,523	1	Oct. 19	-/10½	-/10½	Do. 4½ p.c. Red. Cum. Pf.	20/6—22/6	...	...
110,000	Stk.	Dec. 14	4	4	Do. 4 p.c. Red. Deb. ...	98—103	...	...
750,541	,,	Feb. 1	5	5½	Southampton Ord. 5 p.c. ...	111—116	...	...
148,836	,,	Jan. 4	4	4	Do. 4 p.c. Deb.	98—103	...	98—99
350,000	,,	Feb. 15	5½	5½	Swansea 5½ p.c. Red. Pref. ...	110—115	...	...
106,000	,,	Jan. 4	6½	6½	Do. 6½ p.c. Red. Deb. ...	98—101	...	...
94,000	,,	,,	3½	3½	Do. 3½ p.c. Red. Deb. ...	95—100	...	...
1,076,490	,,	Feb. 15	6½	6½	Tottenham and District Ord.	137—142	...	140½—141
409,835	,,	,,	5½	5½	Do. 5½ p.c. Pref....	123—128	...	...
62,235	,,	,,	5	5	Do. 5 p.c. Pref. ...	110—115	...	...
371,850	,,	Nov. 30	4	4	Do. 4 p.c. Deb. ...	98—103	...	...
373,939	,,	Feb. 15	7	7	Uxbridge, &c., 5 p.c. ...	142—147	...	...
133,010	,,	,,	5	5	Do. 5 p.c. Pref. ...	110—115	...	110
1,371,138	,,	Feb. 1	7	7	Wandsworth Consolidated ...	142—147	...	143—147
1,620,615	,,	,,	5	5	Do. 5 p.c. Pref ...	113—118	...	115
500,000	,,	,,	33/4	4	Do. 4 p.c. Pref. ...	95—100	...	...
1,343,964	,,	Dec. 14	5	5	Do. 5 p.c. Deb. ...	117—122	...	...
383,745	,,	,,	4	4	Do. 4 p.c. Deb. ...	98—103	...	99
558,342	,,	Feb. 1	7	7	Watford and St. Albans Ord.	142—147	...	...
200,000	,,	,,	5	5	Do. 5 p.c. Pref. ...	110—115	...	112—113
200,000	,,	,,	5½	5½	Do. 5½ p.c. Pref. ...	123—128	...	...
200,000	,,	Dec. 14	4	4	Do. 4 p.c. Red. Deb.	97—102	...	...
100,000	,,	,,	3½	3½	Do. 3½ p.c. Red.Deb.	95—100	...	...

a.—The quotation is per £1 of Stock. * Ex div. † Paid free of income-tax. ‡ For year. § Actual.

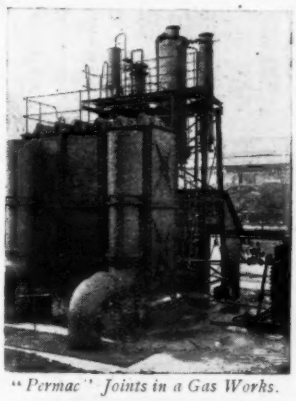
Stock and Share List continued overleaf.

First came "Permac"!

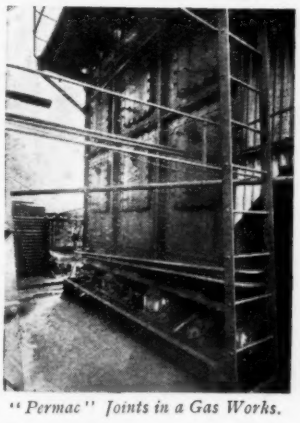
(the ***original*** *metal-to-metal Jointing)*



"Permac" Joints in a Gas Works.



"Permac" Joints in a Gas Works.



"Permac" Joints in a Gas Works.

Cheap imitations are ever appearing. Do not be misled! "Permac" has been manufactured *solely* by Thomas & Bishop Ltd. since 1915. Its unaltering worth is *proved* every day in Gas Works all over the country.

Permac
METAL-TO-METAL JOINTING MATERIAL.

Obtainable only from:

THOMAS & BISHOP LTD
37, Tabernacle St.
LONDON, E.C. 2

STOCK AND SHARE LIST—Cont.

Stocks Officially Quoted on Provincial Exchanges

Issue. £	Stock or Share	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations. Apl. 9.	Rise or Fall on Week.	Transactions, Lowest and Highest During the Week.
BRISTOL EXCHANGE.								
347,756	Stk.	Feb. 1	5	6	Bath Cons.	120—122	−1	...
1,667,250	,,	Feb. 15	5	5	Bristol, 5 p.c. max.	114—116	...	...
120,420	,,	Dec. 14	4	4	Do. 1st 4 p.c. Deb. ...	101—103	...	...
217,870	,,	,,	4	4	Do. 2nd 4 p.c. Deb. ...	101—103	...	...
328,790	,,	,,	5	5	Do. 5 p.c. Deb.	122—125	...	...
274,000	,,	Mar. 1	5	5	Newport (Mon.) 5 p.c.max. ...	108—112	...	...
13,200	12	Mar. 15	7	8	Pontyp'l Gas & W. 10 p.c. 'A'	13½—14¼	...	...
13,600	10	,,	5	6	Do. 7 p.c. 'B'	12—12½	...	...
40,000	10	,,	5	6	Do. 7 p.c. 'C'	12—12½	...	...
140,778	Stk.	Feb. 1	5	5	Weston-super-Mare Cons. ...	112—113	...	...
64,338	,,	Dec. 14	4	4	Do. 4 p.c. Deb.	98—101	...	...
33,340	,,	,,	7½	7½	Do. 7½ p.c. Deb.	160—163	...	...
LIVERPOOL EXCHANGE.								
157,150	Stk.	Feb. 1	5	6½	Chester 5 p.c. Ord.	106—111	...	...
92,500	,,	Dec. 14	4½	4	Do. 4 p.c. Pref.	98—102	...	...
36,430	,,	,,	3	3½	Do. 3½ p.c. Deb.... ...	90—95	...	...
41,890	,,	,,	4	4	Do. 4 p.c. Red. Deb. ...	99—103	...	...
2,167,410	,,	Feb. 15	6	6	Liverpool 5 p.c. Ord. ...	123½—125½	+½	...
245,500	,,	Dec. 14	5	5	Do. 5 p.c. Red. Pref. ...	101—106	...	...
306,083	,,	Jan. 4	4	4	Do. 4 p.c. Deb. ...	103—105	...	...
106,280	,,	Feb. 1	10	10	Preston 'A' 10 p.c.	210—220	...	...
188,219	,,	,,	7	7	Do. 'B' 7 p.c.	150—160	...	...
NEWCASTLE EXCHANGE.								
122,577	Stk.	Feb. 1	8	8	Blyth 5 p.c. Ord.	166—168	...	...
732,000	,,	Feb. 15	5	5	Hartlepool G. & W. Cn. & New	125—127	...	...
2,061,315	,,	Feb. 1	5	5⅝	Newcastle & Gateshead Con.	24/3—24.9*a*	+·/3	...
682,856	,,	,,	4	4	Do. 4 p.c. Pref. ...	99—101	+4½	...
776,706	,,	Jan. 4	3½	3½	Do. 3½ p.c. Deb. ...	95—100	...	...
277,285	,,	Nov. 2	5	5	Do. 5 p.c. Deb. '43...	108—109	...	...
332,351	,,	Feb. 1	6	6	Sunderland 6 p.c. max. ...	139—141	...	...
NOTTINGHAM EXCHANGE.								
542,270	Stk.	Mar. 1	7	9	Derby Con.	160—180	...	...
55,000	,,	Dec. 14	4	4	Do. 4 p.c. Deb.	100—105	...	...
84,750	,,	Feb. 17	5	12	Long Eaton 'A' Ord. ...	...	...	...
50,000	,,	,,	4	10	Do. 'B' Ord. ...	...	...	...
20,000	10	Dec. 14	5	5	Do. 5 p.c. Pref. ...	10—12	...	...
80,000	Stk.	,,	5	5	Do. 5 p.c. Deb. ...	105—110	...	...
SHEFFIELD EXCHANGE.								
10,000	Stk.	Aug. 10	10	10	Great Grimsby 'A' Ord. ...	210—220	...	...
6,500	,,	,,	10	10	Do. 'B' Ord. ...	210—220	...	...
79,000	,,	,,	10	10	Do. 'C' Ord. ...	205—210	...	...
1,806,339	,,	Feb. 15	6	6½	Sheffield Cons.	144—146	...	...
95,000	,,	Jan. 4	4	4	Do. 4 p.c. Deb.	101—104	...	...

Supplementary List of Stocks and Shares not Officially Quoted

202,152	Stk.	Mar. 15	25/-*b*	25/-*b*	Ascot Ord.	102—107	...	...
128,182	,,	Jan. 4	5	5	Do. 5 p.c. Pref.	110—115	...	...
312,083	1	Nov. 16	5	5	Assd. Gas and Water Ord. ...	19/6—21/6	...	...
326,071	1	,,	4½	4½	Do. 4½ p.c. Cum. Pref. ...	19/6—21/6	...	21/—21/3
150,000	Stk.	Mar. 15	3½	3½	Do. 3½ p.c. Red. Deb. ...	95—100	...	97¼—98
17,000	,,	Feb. 15	8	8	Bognor Orig. Ord. 'A' ...	160—170	...	...
62,210	,,	,,	8	8	Do. New Addl. 'A' ...	160—170	...	...
87,160	,,	,,	7	7	Do. New 7 p.c. max. ...	140—145	...	...
37,440	,,	Feb. 1	10	10	Cam. Univ. & Town 10 p.c.max.	200—210	...	...
125,970	,,	,,	7	7	Do. 7 p.c. max.	142—147	...	...
39,025	,,	,,	5	5	Do. 5 p.c. max.	102—107	...	...
65,000	,,	Mar. 1	7½	8½	Eastbourne 'A' 5 p.c. ...	160—165	...	...
198,000	,,	,,	6	7	Do. 'B' 3½ p.c.	130—140	...	...
112,312	,,	,,	5	5	Do. 5 p.c. Pref.	110—115	...	...
130,000	,,	Dec. 14	5	5	Do. 5 p.c. Deb.	115—120	...	...
24,000	30	Feb. 1	8½	8½	Great Yarmouth 8½ p.c. max.	45—50	...	...
59,400	30	,,	7½	7½	Do. 7½ p.c. max.	40—45	...	...
51,160	Stk.	Dec. 14	5½	5½	Do. 5½ p.c. Deb.	122—127	...	...
152,600	,,	Feb. 15	8	9	Guildford Cons.	190—200	...	...
54,055	,,	,,	5	5	Do. 5 p.c. Pref.	112—117	...	...
68,250	,,	Dec. 14	5	5	Do. 5 p.c. Deb.	115—120	...	...
156,600	,,	Feb. 15	7½	7½	Hampton Court Cons. ...	150—160	...	...
107,960	10	Mar. 15	4	5½	Mid Kent Ord.	9—10	...	...
230,940	Stk.	Feb. 15	10	10	Oxford & District Ord. ...	200—210	...	...
47,112	,,	,,	5	5	Do. 5 p.c. Pref.	110—115	...	...
50,000	,,	,,	6	6	Do. 6 p.c. Red. Pref. ...	112—117	...	...
126,193	,,	Nov. 16	7½	7½	Peterborough Ord.	162—172	...	...
64,990	,,	Mar. 15	6½	7½	Redditch Ord.	127—137	...	...
166,850	,,	Feb. 15	8	8	Romford Ord.	157—167	...	...
60,000	,,	,,	4	4	Do. 4 p.c. Pref.	97—100	...	...
44,000	,,	Mar. 15	5	5	Do. 5 p.c. Deb.	115—120*	...	...
10,950	,,	Mar. 1	8	8	Ryde Ord.	160—165	...	...
136,191	,,	Feb. 15	5	7	Scarborough Ord.	123—133	...	...
27,825	,,	Feb. 1	8	8	Shanklin & Ventnor Cons. ...	165—175	...	...
270,086	,,	Mar. 15	7	7	Slough Ord.	137—142	...	...
21,000	,,	Dec. 14	5	5	Do. 5 p.c. Deb.... ...	113—118	...	...
28,872	1	Nov. 2	5½	5½	S. Midland Gas Cpn. Ltd. Ord.	19/—22/-	...	...
28,866	1	Mar. 15	4½	4½	Do. 4½ p.c. Red. Cum. Pref.	18/6—20/6	...	...
137,730	Stk.	Feb. 15	7	7	Southgate & Dist. 7 p.c. max.	135—145	...	...
62,500	,,	,,	5	5	Do. 5 p.c. Pref.	110—115	...	113½
117,228	,,	Feb. 15	6	5	Swindon Cons.	108—113	...	...
60,425	,,	Dec. 14	5	5	Do. 5 p.c. Deb.	113—118	...	...
64,380	,,	Dec. 14	5	5	Torquay and Paignton 5 p.c. Pf.	115—120	...	...
750,000	1	Apl. 5	4	6	Utd. Kingdom Gas Cpn. Ord.	20/—22/-*	...	21/4½
936,338	1	Nov. 16	4½	4½	Do. 4½ p.c. Ist Cum. Pref.	20/—22/-	...	20/6—21/-
674,084	1	Apl. 5	4½	4½	Do. 4½ p.c. 2nd Non-Cum. Pref.... ...	18/6—20.6*	−/6	19/-
600,000	Stk.	Mar. 15	3½	3½	Do. 3½ p.c. Red. Deb. ...	96—101	...	...
130,000	,,	Feb. 15	5	8	Wakefield Ord.	132—137	...	...
81,650	,,	,,	5	5	Do. 5 p.c. max.	103—108	...	...
82,000	,,	Feb. 1	6	6	Weymouth Ord.	103—108	...	...
98,384	,,	Feb. 1	6	6	Wolverhampton 6 p.c. Pref....	125—130	...	...
160,000	,,	Dec. 14	5½	5½	Do. 5½ p.c. Rd. Db	110—115	...	...
370,000	,,	Feb. 15	4	6	York Cons.	105—110	...	...
90,000	,,	Dec. 14	5	5	Do. 5 p.c. Red. Deb. ...	105—110	...	...
133,640	,,	Mar. 1	6½	6½	Yorktown (Cam.) 5 p.c ons.	130—135	...	...
120,000	,,	,,	5	5	Do. 5 p.c. Pref.	110—115	...	...
35,000	,,	Dec. 14	5½	5½	Do. 5½ p.c. Deb.... ...	125—130	...	...

a The quotation is per £1 of Stock. *b* Actual for Quarter. * Ex div.

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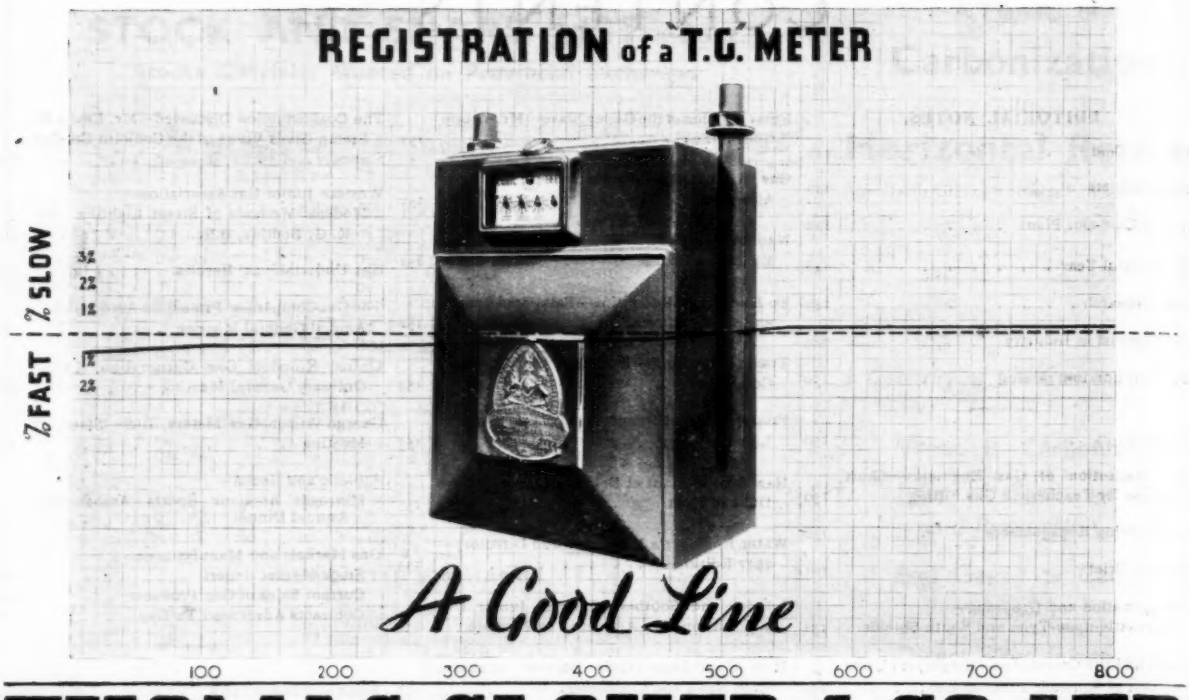

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